Transitions to Parenthood and Life Course Trajectories:

Variations between Mothers and Fathers as well as Māori and non-Māori

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Author Note

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Preface

When conducting a literature review for the onset of parenthood and life course outcomes, I was struck by the lack of literature on older parents, on fathers and culturally appropriate research conducted on Māori parents. As I was able to use longitudinal data from a birth cohort in the Christchurch Health and Development Study (CHDS), I was in the fortunate position of being able to focus on these three research gaps for my dissertation.

Quantitative research has been criticised for being egocentric and results are frequently interpreted without considering the effects of wider contextual impacts such as intergenerational trauma or institutionalised racism (Didham & Boddington, 2011; Pihama, 2011). Nor does it consider social context or Māori cultural values or perspectives on topics such as parenthood. This usually results in Māori and Māori culture being viewed negatively for contributing to adverse outcomes. As I am Māori (Ngāti Kahungunu, Ngāruahine), I was particularly motivated to examine differences in the onset of parenthood and life course outcomes between Māori and non-Māori without imposing a deficit view can occur in quantitative research. The Māori cultural variables utilised in this dissertation were originally developed in collaboration between the CHDS and the Ngāi Tahu Māori Health Research Unit (NTMHRU) and although not without limitations (discussed within this dissertation), enabled a unique opportunity to examine Māori cultural differences.

The intention of this dissertation is to identify and understand differences in life course pathways to parenthood and outcomes through analysing differences between those who are younger and older, mothers and fathers as well as Māori and non-Māori. The purpose of this analysis is not to determine which group has the optimal life course pathway but rather through understanding differences, draw conclusions on how parents can achieve optimal outcomes. To support this endeavour, I draw upon Macfarlane's (2015) braided drives model where I bring my Māori stream of knowledge to critically combine with my statistical

methodological approach when analysing and interpreting results. Thus, blending my world view as a Māori with statistical approaches. This dissertation includes data from multiple study waves of the CHDS. Whilst I did not contribute directly to data collection from waves completed prior to this PhD enrolment, I did contribute substantially to the design of measures and data collection of the most recent follow-up assessment of the CHDS cohort at age 40 years. In addition, I completed all analyses for this dissertation. Specifically, I was responsible for the following research tasks related to the preparation of this thesis.

- Conceptualisation of all research questions addressed within this thesis.
- Preparation of all parented related items included in the 40-year interview schedule.
- Proof reading and editing the complete 40-year interview schedule.
- Modifying the Māori cultural assessment in collaboration with Māori supervisors and staff at the Ngāi Tahu Research Centre.
- Participation in the recruitment and training of all study interviewing staff. In addition, I also personally assisted with data collection and was responsible for interviewing approximately 20 cohort members.
- Reliability checking the data files to ensure there is no missing data or incorrect responses for all 904 cohort members,
- Independent completion of all the statistical analyses, undertaken as part of this thesis including writing equations for the statistical methods section, and interpretation for this dissertation under the supervision of John Horwood (statistician) former Director of CHDS,
- I have conducted and been responsible for the preparation and writing of this dissertation and accompanying manuscripts (in preparation) with guidance from my supervisors as is normal practice for a PhD.

Acknowledgements

Ehara taku toa i te toa takitahi, engari kē he toa takitini

My success should not be bestowed onto me alone, it was not individual success but the success of a collective

Throughout this journey many people have played a role in supporting me with emotionally, socially, and financially. Although the list of people to thank is longer than what is here, the names and organisations listed below have played a big part in allowing me to complete my dissertation and begin my career in research.

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A special thank you goes to Michael and the Gilbertson family for the support and encouragement through all of post-grad. You all made me feel welcomed in your family and I appreciate you letting me stay on the farm for my working holidays and cooking me meals to ensure I could meet my deadlines and still relax.

To my whānau, thank you for the words of encouragement and support. You all reminded me that it was important to complete my studies and talk about my mahi to show others they can be Māori and research or study in STEM. You have all supported me unconditionally and always made me feel like I could achieve whatever I set my mind too. To Jaco, thank you for tolerating living with me for the final 18 months of my PhD. You let me take over the living room to work and occasionally watched the pets for me. You always have an energetic wairua that made the house feel like a home. You are the best little brother I could have asked for.

MAI ki Waitaha, the postgraduate support network at UC and beyond. This rōpū provided me with opportunities to share and present my research in culturally safe spaces and facilitated integration into Māori and indigenous networks that I will value for the rest of my life. More specifically, Teariki, Jake, Mariah, Zac, Rory, and my main man Mark, thank you all for being there and for being the awesome people you are. It was due to your manaaki and aroha I was able to complete this PhD journey without feeling isolated and alone.

I would like to acknowledge the many ways the Christchurch Health and Development Study contributed to the completion of this dissertation. Firstly, thank you to all the participants who contributed to the CHDS over years, without your contribution to this amazing data set this dissertation could not have been completed. Secondly, thank you to John and Joe for allowing the CHDS data to be used for my PhD but also providing me with employment whilst studying. Thirdly, thank you to the CHDS staff, who have all taken time to teach me new skills and being supportive of me along the way, especially Bridge who would go for walks with me and let me procrastinate by telling her random information. Overall, thank you CHDS for providing a supportive and culturally safe environment for me to complete my research. I know how privileged I was to receive the endless support and encouragement from the entire team.

Likewise, I would like to acknowledge the many ways the Ngāi Tahu Research Centre also contributed to the completion of my dissertation. Thank you for the financial support by granting me a Ngāi Tahu Research Centre Doctoral Scholarship and allowing me to commandeer an office. A special thank you goes out to the NTRC staff. You all provided me with a welcoming and supportive environment to work and study in and always encouraged me to persevere till the end. Specifically, I would like to thank Matt, who endured my venting and occasionally took on bits of my work when I was stressed so I could focus on completing the PhD. It meant a lot having you look out for me. A special thank you also goes to Paul. You always took the time to check on me and other students, provide good banter over coffee and hot chocolates, made sure I was always paid on time, and welcomed me into your family. You are one of the first friends I made at UC and now you are stuck with me. Overall, I would like to thank NTRC staff for looking out for me, making me feel welcome and part of the team, you are all part of the reason Ōtautahi has become home to me.

Thank you, Janet for being the primary supervisor and being the only person who has read this dissertation from start to finish multiple times. I appreciate the time you took to frequently meet with me and check on my progress, shouting coffee and offering general life advice so I did not burn out. Your hard work did not go unnoticed, and I hope to have the opportunity to pay it forward one day.

To Joe, you should be acknowledged for trying to teach me grammar and improve my writing style. Apostrophes still confuse me, but this dissertation is not the end of our working relationship so you will have plenty more opportunities to teach me grammar. In general, thank you for being the type of boss/supervisor who looked out for my personal wellbeing

and cultural safety in the office. I always knew you would support me if I ever needed it and that is a big reason as to why I will be sticking around CHDS for a while.

To John Reid, thank you for being my supervisor, mentor, colleague, and friend. You bought me on to your amazing team of intelligent misfits and always made me feel welcome. Thanks to you I learnt being Māori and being a quantitative researcher does no have to be mutually exclusive. Without knowing, you have played a major role in shaping my aspirations for my career and the type of researcher I desire to be one day. I am excited to continue working with you as part of the Quadro and learning all that you, Matt and Jay have to teach.

My final thank you is to Poppa John Horwood. Without you this PhD would have broken me. You took the time to teach me statistical software, how to run statistical analyses, even if that meant explaining it over and over. I will still write sentences that are not sentences but at least I have a better chance of recognising my grammatical errors. You have been more than just a boss to me and the patience, support, guidance, and advice you gave me over the years has been worth more than I can express. I hope you know I appreciated every bit of it.

Ahakoa ngā piki me ngā heke, tū mai koutou ki tōku taha, ko tēnei tuhinga whakapae, mō mātau katoa. He rā ki tua

Throughout the good and the bad, you have stood by my side, this thesis is for us all. Now on to bigger things.

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Abstract

Background: There is an abundance of research on the onset and outcomes of young parents. However, little is known about delayed onset of parenthood and subsequent life course outcomes. This research intends to address this gap in the literature, as well as provide new findings relating to gender and Māori ethnic differences in the onset of parenthood and life course outcomes.

Aim: The aims of this dissertation were (1) to document the onset of parenthood in the Christchurch Health and Development Study cohort up to age 40 and identify factors predictive of an early versus a delayed transition to parenthood; (2) to examine the associations between the onset of parenthood and life course outcomes at age 40 years, by investigating whether any outcome differences were explained by prior childhood and adolescent characteristics or by mediating processes associated with an earlier onset of parenthood; (3) examine gender and ethnic differences in (a) the timing of the transition to parenthood, and (b) the nature of the associations between timing of parenthood and subsequent outcomes; and (4) explore the role of cultural affiliation as a further explanatory factor within the Māori cohort.

Method: The studies conducted in this dissertation were based on the Christchurch Heath and Development Study (CHDS). The CHDS is a longitudinal study of a birth cohort born in 1977 and assessed up to the age of 40. For Study 1 (N = 1055), life table methods were applied to produce Kaplan–Meier estimates of the accumulative rate of parenthood in the cohort from age 16–40 years old. To examine the extent to which the timing of early parenthood was influenced by an individual's earlier childhood and adolescent experiences as well as an individual's changing circumstances, a series of measures was obtained from the CHDS database and included in the analyses. These included childhood and adolescent fixed factors examining socio-demographic background, family structure, family functioning,

childhood abuse exposure, childhood behaviour, school achievement, adolescent functioning and individual traits, as well as time dynamic factors to account for changing circumstances relating to relationship duration, employment, welfare, mental health, substance use, educational pursuit and attainment. Study 2 (N = 693) examined the extent to which the onset of parenthood was associated with adult functioning outcomes at age 40, a series of outcomes related to socio-economic well-being, education, household composition, psychosocial well-being and mental health. A range of fixed factors and mediating factors were obtained from the CHDS database to examine the extent to which outcomes were influenced by childhood/adolescent and mediating factors that were associated with parenthood.

Results: Earlier onset of parenthood was associated with family, social and individual disadvantage during childhood and adolescence, whereas delayed onset of parenthood was associated with economic and relationship stability. Gender and Māori ethnic differences were observed for an earlier onset of parenthood, but not for delayed onset of parenthood. No factors identified in this dissertation explained the gender difference observed in earlier onset of parenthood. For the Māori cohort, greater Māori cultural affiliation was associated with an earlier onset of parenthood, whereas less Māori cultural affiliation was associated with delayed parenthood. For every outcome assessed, younger parents were more likely to be disadvantaged than peers who delayed parenthood. The disadvantage experienced by younger parents was associated with an accumulation of childhood and adolescence adversity as well as reduced support and opportunities during early adulthood. When accounting for confounding and mediating factors, no difference was observed in outcomes between males and females or Māori and non-Māori.

Conclusions: There are multiple pathways towards the onset of parenthood, yet these pathways do not differ between men and women, nor between Māori and non-Māori. Furthermore, young parents are more likely to experience greater disadvantage by age 40

than older parents. The disadvantages younger parents experienced were not necessarily due to the timing of parenthood per se, but rather due to the accumulation of disadvantage experienced during childhood and adolescence. For the onset of parenthood, Māori cultural affiliation, or lack thereof, during early adulthood was associated with the onset of parenthood; however, cultural affiliation was not associated with any differences in outcomes by age 40 except for that of cultural affiliation at age 40.

Glossary

Hapū	Subtribe
Iwi	Tribe
Kawa	Protocol
Kotahitanga	Togetherness or unity
Mana	Prestige or status
Manaakitanga	Hospitality, kindness, or generosity
Marae	Village common
Mātauranga Māori	Māori knowledge
Tangata Whenua	People of the land
Tamariki	Children
Te Ao Māori	The Māori world view
Tikanga	Customs
Whakapapa	Genealogy
Whakawhanaunga	Having / forming relationships
Whānau	Extended family or family group
Whenua	Land

Chapter 1: Context for Dissertation

2.1 Transition to Parenthood

The transition to parenthood is often seen as a key developmental event in an individual's life. For women this period can span more than 35 years, as evidenced in the reporting of the age of mothers in official New Zealand statistics ranging from under 16 to over 40 years old (Statistics New Zealand, 2019a). Despite the lack of statistics regarding the onset age for fathers, this range is often greater for men (Statistics New Zealand, 2019b). Due to the potential variability in the age in which one can transition to parenthood, research has been dedicated to understanding the mechanisms associated with the onset of parenthood and subsequent outcomes. However, the majority of the literature has become synonymous with young mothers and life course outcomes between 20 and 30 years old. Consequently, there is a gap in the literature examining the extent of gender differences (i.e. mothers and fathers) in the onset of parenthood and subsequent outcomes. Therefore, there is little certainty if the factors predicting the timing of motherhood are the same for fathers, which could be essential in understanding gender differences in the onset of parenthood or patterns of fertility, especially if designing any policy or programme interventions. Furthermore, mothers traditionally have a more prominent role in childcare and household labour than fathers (Gibb et al., 2013; Hakim, 2003). Therefore, it is important to consider whether the onset of parenthood has the same impact on both mothers and fathers.

Māori are the indigenous people of Aotearoa New Zealand, who are often referred to as tangata whenua (people of the land). Within New Zealand, Māori have consistently reported higher rates of early parenthood than their European counterparts (Cribb, 2009; Statistics New Zealand, 2019b). Yet there is little, to no research dedicated, to understanding differences in time of parenthood and subsequent outcomes between Māori and non-Māori. As Māori belong to a traditionally collectivist culture, they are likely to have different

cultural values that may potentially influence the onset of parenthood. Furthermore, in addition to differential timing in parenthood, Māori are reported to be disproportionally disadvantaged across a range of social indicators (Cormack et al., 2020; Marriott & Sim, 2015; Ministry of Health, 2018; Robson & Reid, 2001). Therefore, there is an important need to explore whether Māori and non-Māori parents experience the same outcomes associated with the onset of either early or delayed parenthood. It should be noted, for the purposes of this dissertation, the term non-Māori will be used throughout to encompass individuals that identify as Māori or being of Māori descent.

The role of ethnicity and culture is often critiqued within parenthood literature, as they are often reduced to be a causal explanation or risk factor for adverse outcomes. Therefore, when researching Māori, consideration needs to be given to wider social structural issues, systemic racism, cultural perspectives or the impact of historical events when formulating research questions and interpreting results (Nash, 2001; Pihama, 2011; Robson & Reid, 2001). In doing so, this ensure neither Māori culture nor ethnicity is reduced to "one catalogue of problematic aspects" (Breheny & Stephens, 2010, p.13). This dissertation seeks to incorporate a Māori perspective throughout to ensure the research conducted is culturally appropriate.

2.1.1 Purpose of This Dissertation

The purpose of this dissertation is to make a unique contribution to existing literature on parenting onset and subsequent life course outcomes and extend on the findings published in this area by the Christchurch Health and Development Study (see section 1.2 for details). Overall, the aim of this dissertation is to examine and identify the factors predictive of early and delayed onset parenthood, as well as to identify and explain any differences in life course outcomes between early and delayed parenthood. In addition, to reduce gaps in the literature regarding gender, this dissertation will include a comparison of mothers and fathers, and also

of importance, will examine ethnic differences in the onset of parenthood and life course outcome by including a comparison of Māori and non-Māori parents. Both of which will be original contributions to the literature.

In order to understand the relevance of researching parenthood, particularly in the New Zealand context, the rest of this chapter will outline the following: changes in parenthood in New Zealand over time, clarification of definitions of parenthood, and provide a summary of the portrayal of parenthood in the literature, and finally, introduce the CHDS and its relevance in researching parenthood.

2.1.2 Changes in Parenthood in New Zealand

Within each society there are social and cultural values pertaining to the appropriate period to transition into parenthood. Within most western countries, the appropriate time to transition into parenthood coincides with a traditional life pathway of: education → employment → relationship → parenthood (Astone & Peters, 2014; Dariotis et al., 2011; Ravanera & Fernando, 2004). While this may be the case, there is evidence to suggest that with each generation in New Zealand and other western countries, there has been deviation away from the traditional life pathway that has resulted in increases in the median age of parents, and changes in the formation of families.

Using official statistics of New Zealand, Cribb (2009) and the Families Commission (2008) have documented the evolution of families over the past 60 years. As part of their research, the authors identified intergenerational differences in the timing of parenthood and formation of families across three generations, with additional analysis contrasting Māori and non-Māori mothers. The first generation consisted of people who were born prior to 1943 and were referred to as the pre-World War II era. The second generation consisted of people who were born between 1944 and 1970 and were referred to as the baby boom era or "baby boomers". Finally, the third generation consisted of people born between 1971 and 1993 were

referred to as the children of the baby boomers. The authors found that with each generation there was a change in both the timing of parenthood and how families were formed. These differences are described below.

The first generation (born prior to 1943) often followed a traditional life course pathway towards parenthood, in which couples married within their twenties and had children soon after. As a result, parents were often young and had large homogenous families. In contrast the second generation known as baby boomers (born between 1944 and 1970) began to diverge away from this traditional life course pathway. This was reflected in the declining rates of marriage, resulting in an increase in single parents and step families within New Zealand. Thus baby boomers were described as being relatively older parents who had smaller, less homogenous families than the first generation. The divergence away from the traditional life course pathway towards parenthood continued with the third generation (born between 1971 and 1993). This resulted in a further decline of marriage rates and a rise in de facto relationships and blended families. Similar to the baby boomers, the third generation continued to be older parents and have smaller, less homogenous families. Both Cribb (2009) and the Families Commission (2008) have attributed these intergenerational changes to a range of global, economic and social factors that include the increased involvement and participation of women within education and employment. In summary, the authors observed that with each new generation in New Zealand, there has been an increased delay in the timing of parenthood, and changes in the formation of families.

These changes are further emphasised in the official recording of statistics in New Zealand (Statistics New Zealand, 2019b), which reported the increasing median age of both mothers and fathers. As shown in Table 1, between 1980 and 2018 the median age of mothers increased from 25.7 to 30.5 years, whereas for fathers the median age increased from 28.5 to 32.4 years. In addition to the increase in the median age of parents over the past few decades,

it should also be noted that the median age of fathers was also consistently marginally higher than for mothers. Similar findings regarding an increase in delays in parenthood, with fathers often older than mothers was also observed in England, Wales, Denmark, and France (Schmidt et al., 2011). When reporting the median age of parents by ethnicity, information regarding fathers is difficult to locate. Official statistics reported that between 1998 and 2018 the median age of mothers increased from 29.3 to 30.5 years, with Māori mothers often being much younger than European mothers (Statistics New Zealand, 2019b). The extent of ethnic differences regarding Māori and non-Māori parents will be discussed in more detail later (see section 2.4.1 below for details). The majority of the literature examining parenthood in New Zealand and other countries is focused on mothers and little is focused on possible Māori and non-Māori differences. There are evidently many gaps within the literature, and more research is needed to examine both gender and ethnic differences in the timing of parenthood; this research will contribute to filling those gaps.

Table 1
Median age of mothers and fathers at birth of their first child

Gender	1980	1990	2000	2010	2018
Female	25.7	27.7	29.7	29.9	30.5
Male	28.5	30.4	32.2	32.3	32.4

From Statistics New Zealand (2019b)

2.1.3 Defining the Onset of Parenthood

It is evident that within New Zealand, there have been substantial changes in the onset of parenthood and formation of families with each generation. Deviation away from the traditional life course pathway has led to changes in the social norms regarding relationship status and diverse family formations (e.g. sole parents and blended families). However, the timing of parenthood has remained a contentious topic of interest. Transitioning into parenthood "too early" or "too late" is often met with stigmatisation and marginalisation

(Collins, 2010; Jaffee et al., 2001; Statistics New Zealand, 2001; Whitley & Kirmayer, 2008). As previously mentioned, with each generation the median age of parents varies across gender and ethnicity. There is no consistent definition or terminology used to identify and categorize early onset or delayed onset of parenthood. Depending on the sample, country and era in which parenthood is researched, the reference point to define either early or delayed parenthood varies substantially. For example, some studies use the median age of the sample to reference younger or older parents, whereas others reference the median age of parents in the country the sample originated from. Due to the incongruent operationalization of the timing of parenthood across research, inconsistencies in the results can often be found.

Research relating to earlier onset of first parenthood has included parents between the ages of 14 and 25 years old and the terminology used to characterise these groups include: teenage or adolescent parents (Brown, 2011; Card & Wise, 1978; Collins, 2010; Marsiglio, 1987; Zuckerman et al., 1987), early parents (Dariotis et al., 2011; Hobcraft & Kiernan, 2001; Lee & Gramotnev, 2006) and young parents (Sigle-Rushton, 2005; Smythe & Payne, 2007). Similarly, research relating to delayed onset of parenthood most commonly includes first-time parents who are older than the median of parents within a given country or reference group. Therefore, delayed onset of parenthood can include any first-time parents aged 25 years or older, with the majority ranging between the ages of 30 or 35 years (Garrison et al., 1997; Martin, 2000; McMahon et al., 2011; Mills et al., 2011) and some papers focusing on first-time parents over 40 or 45 years of age (Mathews & Hamilton, 2014; Schmidt et al., 2012). The terminology used to characterise delayed onset of first-time parents include: delayed parents (Garrison et al., 1997; Hofferth, 1984; Wilkie, 1981), advanced or very advanced parents (Nilsen et al., 2012), late parents (Cooney et al., 1993; Spence, 2008), older parents (Aitken et al., 2016) and postponed parenthood (Gustafsson, 2001; Schlesinger & Schlesinger, 1989). Consideration should be given to the variations in the terminology used to

define and operationalise earlier or delayed onset of first parenthood, as this may reflect different social and cultural norms surrounding the timing of first parenthood, which may influence how findings are interpreted. Throughout this dissertation, the terminology "early" and "delayed onset of" parenthood will be used to reflect younger and older parents in the literature. The specific age ranges used for early and delayed onset of parenthood in each of the studies for this dissertation, will be made clear in the relevant chapters.

2.1.4 Perceptions about the Timing of Parenthood

Different social and cultural norms affect the perceptions of early and delayed onset of parenthood. These are often reflected in empirical literature, which portrays younger and older parents differently. For that reason, the portrayal of early, and delayed onset of parenthood within the literature will be outlined separately below.

2.1.4.1 Perceptions of Early Parenthood in the Literature

In many western countries, there is a traditional life course pathway that includes an appropriate time to transition into parenthood (Astone & Peters, 2014; Dariotis et al., 2011; Ravanera & Fernando, 2004). The appropriate time varies depending on the social norms and cultural values of the country being examined as well as the era in which the research is being conducted. However, regardless of the specific age range that is considered acceptable the traditional life course pathway prioritises education and employment prior to parenthood. As early parenthood interrupts this life course, it is often portrayed as interrupting or truncating education and employment opportunities (Boden, Fergusson, & Horwood, 2008; Phipps-Yonas, 1980; Taylor, 2009; Wellings, Wadsworth, Johnson, Field, & Macdowall, 1999; Whitley & Kirmayer, 2008; Zuckerman et al., 1987). As a consequence, previous literature has identified that younger parents are then perceived as being burdensome. This is reflected in perceptions of young parents being financially dependent on welfare and draining public resources (Davies et al., 1999; Kelly, 1999; Luker, 1997; Shields & Pierce, 2006)

The extent to which these negative perceptions are truly a reflection of adverse outcomes yet to come or are merely a social construction has been challenged by Wilson and Huntington (2006). The authors argued that over the past few decades within the United States, the United Kingdom and New Zealand the normative perceptions have shifted to vilify teenage mothers. This is not due to adverse outcomes, as the literature would lead you to be believe, but rather due to deviation away from the traditional pathway and socially acceptable norms regarding the timing of parenthood. Regardless of what has contributed to the vilification of young parents, many developing countries hold negative perceptions of young parents and seek to reduce the rates of young parents.

Many western countries view the early onset of parenthood as an issue that needs to be addressed. A report by the United Nations Children's Fund (UNCF, 2001) indicated that, of the 28 OECD[1] countries examined, 15 countries including New Zealand were trying to reduce the rates of young parents. This includes researching, developing, or implementing approaches like the Nordic approach that has successfully reduced the rates of teen births across much of Europe (Holgate, Evans, & Yuen, 2006; UNCF, 2001). Historically, New Zealand has had a high rate of teenage parents, which has often been considered a cause for concern (UNCF, 2001). Yet like many countries, between 1980 and 2017 New Zealand has seen a steady decline in young parents but the cause for concern for young parents remains (Ministry of Health, 2019; Social Policy Research and Evaluation Unit, 2015).Yet, is the cause for concern valid? Shields and Pierce (2006) have argued there is often a paradoxical relationship between the construction of young parents, government responses and actual rates of young parents, whereby the negative construction of young parents is not always proportional to the actual rates of young parents. Therefore, in light of the declining trend of

[1] Organisation for Economic Co-operation and Development

young parents in New Zealand, consideration needs to be given to how research is portraying early parenthood and the impacts this may have on young parents.

It is evident that an earlier onset of parenthood is often portrayed as being disadvantageous and a cause for concern for official government bodies. As a result, young parents are perceived as being problematic or burdensome, because they are more likely to be disadvantaged throughout life. This is an issue that needs to be addressed in research. Researchers have identified that negative stereotypes of young parents within literature can contribute to social opinions that increase the marginalisation of young parents, which in turn can further increase disadvantageous outcomes (Wellings et al., 1999; Wilson & Huntington, 2006). However, young parents are not a homogenous group all destined for disadvantageous outcomes for the rest of their life. Thus, to avoid portraying early parenthood in a negative sense, future research should consider alternative perspectives on parenthood. These may include focusing on how to reduce disparities by accepting early parenthood as an alternative life course pathway. Chapter 2 provides a literature review of the factors identified to date that are associated with early parenthood and also subsequent outcomes.

2.1.4.2 Perceptions of Delayed Parenthood in the Literature

Over the past few decades, a marked increase in delayed onset of first parenthood has been observed in many countries including New Zealand (Botting & Dunnell, 2000; Heffner, 2004; Statistics New Zealand, 2019b). As this is a relatively new phenomenon of interest, the literature regarding the onset of delayed parenthood is scarce. In contrast to younger parents, those who delay parenthood are usually perceived positively. This is often a result of literature indicating that older parents are more likely to be financially and socially secure, as well as generally experiencing advantageous outcomes for both them and their children (see section 2.2 for details). Despite being perceived as more positively than early parenthood, delayed parenthood is perceived negatively in two areas of literature.

Firstly, the majority of the literature on delayed parenthood is limited to medical literature. As such, the literature suggests there is an optimal time period in which to have children, and delays in childbearing increase the risk of adverse health outcomes especially for the mother and offspring (Bewley et al., 2005; Heffner, 2004; Lansac, 1995; Mills et al., 2011; Schmidt et al., 2011). As a result, delaying parenthood is constructed as having greater adverse health outcomes, so putting the mother and her child at risk. However, Bewley et al. (2005, p. 589) argue that these generalised findings should be interpreted with caution because "for individual women, a short delay poses little absolute risk. Most pregnancies in women older than 35 have good outcomes, but small shifts in population distribution curves affect large numbers of women". Therefore, the negative perception of delayed parenthood constructed in medical literature may be valid, although the perceived problem may not be proportional to the effect delayed parenthood has on medical risks.

Secondly, delays in the timing of first parenthood have become a topic of greater interest because of the potentially wider societal consequences. Adsera (2005) found that, with the exception of the United States, fertility rates in advanced countries were below replacement (2.1 births per woman), which can have wider negative consequences in the future, including in labour markets. Khawaja et al. (2000) argue that between 1980 and 2005 the fertility rates in New Zealand declined to below replacement level, which has direct implications on society since it affects future population growth, population ageing and social planning. In more recent government statistics, it is evident that the rise in many western countries coincides with a decline in fertility. This is observed in New Zealand (1.84), Australia (1.77), Canada (1.5), United Kingdom (1.79) and the United States (1.77; Statistics New Zealand, 2019b). Based on these low fertility rates across countries, it is evident that delayed parenthood could be perceived negatively due to the greater societal impacts. However, it should be noted that due to a lack of literature in this area, little is known as to

whether the declining fertility rates are a direct result of delayed parenthood, or wider social or cultural effects (e.g. cost of living and changes in social and cultural norms regarding family size).

As delayed parenthood is a recent phenomenon, little is known about the rates of delayed parenthood or the factors contributing to such delays. This dissertation seeks to identify predictive factors that are representative of the causal mechanisms for the delayed onset of parenthood within the context of a New Zealand sample. Chapter 2 provides a literature review of the factors identified to date that are associated with delayed parenthood and also subsequent outcomes.

2.2 Christchurch Health and Development Study

This dissertation uses data from the internationally recognised Christchurch Health and Development Study (CHDS). The CHDS is a longitudinal study of the life course development of a birth cohort of children born in Christchurch over a four-month period in mid-1977. The cohort was recruited by contacting all mothers giving birth to live-born children in all maternity units, both public and private, in the Christchurch urban region during the recruitment period and eliciting their participation in the research. Of the 1,310 children born during this period, the mothers of 1,265 (97%) agreed to participate in the study.

The aim of the CHDS is to examine health, mental health, and psychosocial well-being over the life course. The CHDS seeks to examine and model the predictors and consequences of a range of behaviours, factors and circumstances that occur over the life span, using a developmental lens. The CHDS is method-driven, using statistical techniques appropriate to prospective longitudinal data to explore the causal processes that influence health and well-being throughout the life course. This is relevant because the objectives,

approach, and design of the CHDS ensures it is appropriate for addressing the aims of this dissertation.

To date, the CHDS cohort has been studied on a total of 24 occasions from birth through childhood and adolescence and as adults, with the most recent follow-up assessment being at age 40 years. The CHDS research team has collected tens of thousands of variables over the duration of the study with a broad focus on psychological development over the life course. These include an extensive range of factors during childhood and adolescence relating to family socio-demographics background, family socio-economic well-being, parenting and family functioning, peer influences, child health and well-being, individual characteristics, and behaviours, as well as outcomes throughout adulthood including parenthood, family and household formation, relationship status, economic situation, educational achievement, and mental health.

Since the cohort began transitioning into parenthood during adolescence, six papers have been published (Boden et al., 2008; Fergusson et al., 2012; Gibb et al., 2014; Marie et al., 2011; Woodward et al., 2001; Woodward et al., 2006) reporting factors that predict an earlier onset of parenthood and associated life course outcomes up to age 21, 25 or 30 years. Half of these studies were based on mothers, who reported a live birth that was kept by the mothers. The other half of the studies included the full sample of males and females, with two specifically including both custodial and non-custodial parents. Across the six papers the onset of parenthood ranged from 20 to 25 years, except for the study by Fergusson et al. (2012), which included parents up to the age of 30 years. The relevant findings from these studies will be reported in the literature review in Chapter 2.

This dissertation seeks to greatly expand on the current research base and make an original contribution to the broader literature in this area, in the following ways. Firstly, unlike previous studies, this dissertation will include cohort members who have delayed the

onset of parenthood until the age of 40 years. Secondly, this larger sample will be used to examine the transition to parenthood and the life course predictors of that transition over the full life of the cohort to age 40. Thirdly, this dissertation will document the extent to which the timing of parenthood is associated with a range of adult functional outcomes assessed at age 40. More specifically, research combining all three of these aspects allows the contribution of new knowledge to the literature that has not been reported in the context of a longitudinal study of a birth cohort, especially regarding gender and ethnicity.

Furthermore, the CHDS has collected information regarding gender and ethnicity. To date, Woodward et al., (2006) have reported on gender differences in the onset of parenthood by age 25. Fergusson et al., (2012) identified gender differences in parenthood and alcohol abuse/dependence by age 30 and finally, Marie et al. (2011), identified ethnic differences in the onset of parenthood by age 20. The relevant findings from these studies will be reported in the literature review in Chapter 2. Since these papers have been published, the CHDS has continued to collect data to the age of 40 years. This dissertation will extend further on this earlier work by examining gender differences and ethnic differences between Māori and non-Māori in the onset of parenthood and subsequent life course outcomes. With an original focus on examining whether the role of Māori cultural affiliation contributes to the onset of parenthood and life course outcomes. These new contributions using CHDS data will aid in understanding if gender and ethnic differences remain in delayed parenthood or exist in any other life course outcomes and whether Māori culture may contribute in any way.

There are many advantages to using the CHDS data to study the onset of parenthood and life course outcomes. The CHDS is an internationally recognised longitudinal study with a proven track record of robust valid measures. The collection of data over 40 years provides the opportunity to include prospectively measured predictive factors of parenthood at fixed points in time or that are time-dynamic throughout the life course. The CHDS longitudinal

design allows for detailed modelling and the inclusion of measures that are not always available in most cross-sectional or retrospective studies. In particular, when comparing the CHDS longitudinal data to the wider literature, it is evident its strength lies in its unique ability to use both prospective and time-dynamic measures when assessing the onset of parenthood and later life course outcomes. These longitudinal strengths are vital to addressing the aims of this dissertation to reduce gaps within the literature.

2.3 Overview of the Dissertation

As already established, the main objective of this dissertation is to examine factors associated with the onset of parenthood between the ages of 16 and 40 years and subsequent outcomes at age 40. In addition to examine any differences between male and female, as well as between Māori and non-Māori parents. These outcomes span the domains of family resources, education, household composition, psychosocial well-being and mental health. In order to address these objectives, this dissertation will be structured in the following way.

Chapter 2 will provide a comprehensive review of the literature. The purpose of this literature review is to provide an outline of the factors that have been associated with the timing of parenthood and life course outcomes related to the onset of parenthood as well as identify parenthood literature relating to gender differences and ethnic differences between Māori and non-Māori. To refine the scope of this dissertation, any outcomes related to the offspring, or the medical or physical health of the mother is omitted from the literature review. The specific objectives for each study in this dissertation are also outlined in Chapter 2.

Chapter 3 provides a general method for the current research by outlining the CHDS and methodological information that is relevant to both studies conducted in this dissertation.

Chapter 4 describes Study 1, which report findings on the onset of parenthood in the cohort up to age 40 years, the factors identified to be predictive of an early versus a delayed transition to parenthood and a comparison of gender and ethnic differences.

Chapter 5 reports Study 2, which examines the associations between the timing of parenthood and life course outcomes at age 40. This study also includes analyses of gender and ethnic differences. Study 2 also examines whether differences in outcomes between early and delayed onset of parenthood were explained by prior childhood and adolescent characteristics or by mediating processes associated with an earlier onset of parenthood.

Finally, Chapter 6 provides a general discussion, which includes an examination and integration of the specific findings of each study and an exploration of the implications of the studies in the context of wider literature. Chapter 6 also provides a consideration of the limitations of this dissertation and provides recommendations for future research.

Chapter 2: Literature Review: Onset of Parenthood and the Association with Life Course Outcomes

To examine the onset of parenthood and the association with life course outcomes this chapter will provide a literature review for the following five domains: (a) factors predicting the onset of parenthood; (b) outcomes associated with parenthood; (c) gender differences in the literature on parenthood; (d) ethnic differences regarding Māori and non-Māori parents; (e) critique of and limitations in this literature. Finally, the specific objectives of the current research are outlined, including the aims of the two quantitative studies.

3.1 Onset of Parenthood

Due to concerns with high rates of young parents in many western countries, there is an abundance of literature identifying factors predictive of early parenthood. In contrast, due to delayed parenthood being a relatively recent phenomenon of interest, literature identifying predictive factors is scarce. As previously mentioned, the terminology used to define and operationalise early and delayed onset of parenthood varies dramatically throughout the literature. As a result of variations in operationalised definitions, methodological design and sample selection (e.g. single gender sample, young mother sample, cross sectional sample) the predictive factors of early or delayed parenthood identified are not always consistent throughout the literature. Due to differences between predictive factors of both early and delayed parenthood in the literature, these will be discussed separately below. Furthermore, it should be noted that based on previous literature and current government statistics in New Zealand, there is evidence to suggest that the onset of parenthood varies across gender and ethnicity.

3.1.1 Factors Predictive of Early Parenthood

For the purposes of this literature review, the factors identified in the empirical literature will be organised into the following domains: *Family environment*, *education*,

individual characteristics, and *traits*. It should be noted that since the majority of the literature is based on samples of young mothers, the findings in the literature will be contrasted and compared with literature containing samples of young fathers where possible. Due to the lack of research comparing mothers and fathers, any research findings identifying gender differences in predictive factors associated with an earlier onset of parenthood will be discussed where relevant. Due to the particular importance of ethnic differences in the current research, the literature specifying ethnic differences between Māori and non-Māori will be discussed separately (see section 2.4).

3.1.1.1 Family Environment

Family background has been identified as being associated with the early onset of parenthood. In particular these include the role of family structure of parental figures, social class/poverty, and family adversity, each of which will be discussed below.

In samples of either males or females, two aspects of family structure have been identified as influencing the onset of early parenthood. (Archibald, 2004; Dearden et al., 1994; Manlove, 1997; McLanahan & Bumpass, 1988; Pears et al., 2005; Wellings et al., 1999). Firstly, there is evidence that a young parent is more likely to be the child of a mother who was young at first birth (Jaffee et al., 2001; Manlove, 1997; Marie et al., 2011; Pears et al., 2005). In a study of 12,121 females (Manlove, 1997) and another of 206 males (Pears et al., 2005) authors identified that having a young mother was directly and indirectly predictive of parenthood. Based on these findings, the authors suggested that there may be an intergenerational effect on the timing of parenthood. It was inferred that the effect may be due to young mothers influencing attitudes towards earlier parenthood. However, as this was not measured it is uncertain if there is an intergenerational effect on attitudes towards early parenthood.

Using the CHDS, Woodward et al. (2006) conducted research to identify the developmental processes in males and females that increase the likelihood of becoming parents between the ages of 16 and 25 years. The authors found being raised by a young mother was a significant predictor of early parenthood for females but not males. As this study was the only one that examined gender differences in predictive factors of early parenthood that included mother's age, it is uncertain whether this gender difference was specific to this cohort or could be generalised. As Woodward et al.'s (2006) study is one of the few studies that examined gender differences in a sample with childhood and adolescent measures, another gender difference relating to the family environment was observed. The authors found changes of parents in the home was a significant predictor for early motherhood but not early fatherhood. An advantage of the CHDS over other studies is the ability to measure prospective measures in childhood and adolescence. However, when unique findings are observed in CHDS literature it is difficult to ascertain whether these findings are unique to the cohort or could be generalisable.

In three studies using the CHDS data, various publications identified factors predictive of earlier parenthood that were not frequently reported elsewhere. These factors included numerous measurements reflecting poor parental role models including exposure to parental intimate partner violence, parental criminality and parental behaviours of illicit substances and alcohol (Boden et al., 2008; Fergusson et al., 2012; Marie et al., 2011). It is interesting to note that these findings were identified across three papers focusing on different topics, which highlights the validity of CHDS measures. These papers examined ethnic differences in timing of parenthood by the age of 20 years (Marie et al., 2011); the association between early motherhood (by 21) and subsequent life outcomes between 21 and 25 years (Boden et al., 2008); and finally, the transition to parenthood and substance use disorder by age 30 (Fergusson et al., 2012). Based on these findings it is possible to suggest that in

addition to the age of the parents, deviant and non-social conforming behaviours of parental figures may potentially influence values and attitudes towards traditional pathways to parenthood.

In addition to parental age and behaviour, being raised in a single-parent household was a type of family formation found to be predictive of earlier onset of parenthood (McLanahan & Bumpass, 1988; Wellings et al., 1999; Woodward et al., 2001). These findings were identified in cross-sectional studies from the United States in 1982 using a sample of 7,969 females ranging in age from 15 to 44 years (McLanahan & Bumpass, 1988); and another in Britain with a sample of 18,876 participants that included males and females (Wellings et al., 1999); in addition to a study by the CHDS examining the psychosocial background and current economic circumstances of women who became mothers by age 21 (Woodward et al., 2001). The consistency of single-parent households was evident in both cross-sectional and longitudinal studies in different western countries, which suggests there is a relatively robust relationship between being raised in a single-parent household and an early onset of parenthood. While this may be the case, there was one exception in the literature where single-parent households were not predictive of early fatherhood. Using longitudinal data from the National Child Development Study (NCDS) in Great Britain, Dearden et al. (1994) found teenage fathers were no more likely to be raised in single-parent homes than non-fathers. Instead, these authors suggested that lower social class and being raised in financial hardship were better predictors of teen fatherhood. These differences in findings by Dearden et al. (1994) and other literature may reflect the differences in measures of single parenthood across the literature. This includes how and when single parenthood was measured (at birth or across the life span, prospectively or retrospectively) and what additional factors were included in predictive modelling that explained earlier parenthood. In the study of Dearden et al. (1994) it is evident with the longitudinal cohort that numerous

family formations and low socio-economic status during childhood and adolescence were better predictors of early parenthood than being raised in a single-parent household.

The role of family social class or socio-economic status as a predictor of early parenthood is not unique to Dearden et al. (1994). These findings have been consistent in samples of both men (Fagot et al., 1998; Pears et al., 2005; Sigle-Rushton, 2005; Thornberry et al., 1997) and women (Hobcraft & Kiernan, 2001; Van der Klis et al., 2002). Using the CHDS data, in addition to being raised in a single-parent household or by young mothers, various authors identified that socio-economic disadvantage relating to average family income, family socio-economic status, and average family living standards during childhood were predictive of an earlier onset of parenthood (Boden et al., 2008; Gibb et al., 2014; Marie et al., 2011; Woodward et al., 2006). Similar findings have been reported in a descriptive study of pregnancy and abortion trends in Australia. Van der Klis et al. (2002) identified an interesting relationship between socio-economic region, pregnancy rates and abortion. Specifically, lower socio-economic regions had higher rates of teenage pregnancy, whereas in higher socio-economic regions the proportion of pregnancy terminations was greater, suggesting that socio-economic class is not necessarily predictive of early pregnancy, but rather it affects decisions in continuing or terminating an unplanned pregnancy. Although factors associated with continuing a pregnancy or choosing abortion are beyond the scope of this dissertation, it does highlight potential differences in social class attitudes towards early parenthood. These differences in attitude may also extend to culture. As this dissertation is using longitudinal data that did not collect data on social class attitudes or cultural attitudes towards the timing of parenthood, this relationship cannot be directly examined.

In a retrospective study of 9,500 males born in Canada between 1922 and 1980, Ravanera and Fernando (2004) found a bifurcation in fatherhood by social class. Lower social class men tended to follow a non-traditional life-course pathway of entering work, a

relationship then fatherhood earlier, whereas, higher social class men tend to follow a traditional life pathway, focusing on education and employment, which resulted in the onset of fatherhood later in life. These findings suggest that social class may alter life course trajectories that influence the timing of first parenthood. The effect of social class appears to be persistent across time and literature regardless of sample size or methodological design. This led both Manlove (1997) and Pears et al. (2005) to suggest that the effect may not be class, but rather an intergenerational effect reflecting difference in class culture regarding norms about timing of the transition into parenthood. However, since the studies mentioned do not provide measures of intergenerational or social class attitudes towards early parenthood, it is not clear how they might affect behaviours that contribute to early parenthood.

Additional adverse family environment factors and experiences of abuse have been identified as predicting earlier onset of parenthood using CHDS data. Across various CHDS publications, authors have identified that measures of family adversity relating to disadvantaged parental background, poor parental health practices, perinatal outcomes, and disadvantageous child-rearing practices (Boden et al., 2008; Fergusson et al., 2012; Marie et al., 2011; Woodward et al., 2001) were all predictive of an earlier onset of parenthood. The role of parents as guardians that impacted parental attachment were relatively unique to CHDS. An advantage of the CHDS is the ability to include childhood and adolescent measures that are difficult to obtain in retrospective or cross-sectional study designs. This does result in some uncommon childhood and adolescent measures being identified as predicting an earlier onset of parenthood. However, due to the design of the CHDS, it is difficult for other literature to challenge the robustness of the findings.

The difficulty in validating longitudinal findings in literature that is dominated by cross-sectional research extends to CHDS publications having reported the role of physical

and sexual maltreatment during childhood and adolescence as being predictive of earlier parenthood. Five CHDS publications have identified that excessive use of physical punishment or physical abuse was associated with earlier onset of parenthood (Boden et al., 2008; Fergusson et al., 2012; Gibb et al., 2014; Marie et al., 2011; Woodward et al., 2006), although it should be noted that Gibb et al. (2014) did not identify any significant difference in rate of severe physical punishment between young mothers and non-mothers by the age of 20. Similarly experience of sexual abuse was identified as being associated with the earlier onset of parenthood in four CHDS publications (Boden et al., 2008; Fergusson et al., 2012; Gibb et al., 2014; Marie et al., 2011). These findings were also reflected in a qualitative study of teenage pregnancy in Inuit communities, in which Archibald (2004) reported that three different groups mentioned the role of sexual abuse as being a factor associated with earlier pregnancy. A focus group of young mothers and Nunavut Sivuniksavut students said that sexual abuse, rape, and exploitation by older men are potential reasons for earlier parenthood. This was also emphasised in the Pauktuutit study, where participants suggested that due to the high rate of sexual abuse, earlier pregnancies and parenthood are not always by choice (Archibald, 2004). Again, the role of abuse, whether sexual or physical as a predictor of early parenthood is not widely reported throughout empirical literature. This is most likely due to the lack of studies with the capability to reliably measure abuse in childhood. However, due to the reputation of the CHDS, it is fair to consider these are valid findings, but the robustness of these findings are yet to be determined.

3.1.1.2 Education

There is strong and consistent evidence across a range of studies indicating that parental education and individual educational underachievement during childhood and adolescence are associated with an earlier onset of parenthood. In a cross-sectional study of young parents in Britain, Wellings et al. (1999) found that women with no educational

qualifications were more likely to transition into parenthood earlier than their peers who graduated. These findings were further emphasised in publications using CHDS data, which identified educational underachievement during adolescence, whether it were measured by grade point average (GPA), IQ or number of school certificates or passing grades, was consistently associated with an earlier onset of parenthood (Boden et al., 2015; Fergusson et al., 2012; Gibb et al., 2014; Marie et al., 2011; Woodward et al., 2006; Woodward et al., 2001). Likewise, in a sample of males using event history analysis, Pears et al. (2005) found that poor academic performance was related to early fatherhood. Based on the findings, the authors suggested that poor academic performance may be related to lower socio-economic cultural class values and perceptions of future opportunities rather than intellectual ability. Across studies, lack of education is associated with an earlier onset of parenthood; however, more research needs to be conducted to identify whether this is due to academic performance or ability and how this contributes to earlier parenthood.

In additional to an association with individual academic ability, authors have also reported that being raised in a household with parental figures who had low or no educational qualifications was found to be predictive of early parenthood. This was regardless of whether parental education was measured as maternal, paternal or both combined (Boden et al., 2008; Fergusson et al., 2012; Gibb et al., 2014; Hockaday et al., 2000; Marie et al., 2011). In a longitudinal study of more than 12,000 women, Manlove (1997) found that young mothers who grew up in disadvantaged families had fewer educational supports, and lower performance and school attendance, all of which increased their chance of becoming a young mother. When interpreting these findings from an intergenerational perspective, one may infer that the role of parents as educational role models or support may influence individual educational achievement, which is associated with early parenthood.

3.1.1.3 Individual Characteristics and Traits

There is evidence indicating that an array of individual characteristics and behaviours, which are often relatively consistent for both males and females, are associated with an early onset of parenthood. These can be generally categorised into sexual activity, substance use behaviour, antisocial or aggressive behaviour and behavioural problems.

Firstly, there is strong evidence to indicate that sexual activity early in life is associated with earlier onset of parenthood. Throughout empirical literature, early sexual intercourse is usually defined as during adolescence or by the age of 16; this had been termed early sexual intercourse (Fergusson et al., 2012; Rawiri, 2007; Wellings et al., 1999; Woodward et al., 2006), risky sexual behaviour (Pears et al., 2005) and sexual activity (McAnarney & Hendee, 1989; Phipps-Yonas, 1980; Thornberry et al., 1997). Regardless of the terminology used, precocious sexual activity has been identified as being associated with earlier onset of parenthood for both males (Pears et al., 2005; Thornberry et al., 1997) and females (Morgan et al., 1995; Wellings et al., 1999). In a large cross-sectional survey from the National Survey of Sexual Attitudes and Lifestyles in Britain, using participants aged 16–59, Wellings et al. (1999) found that early sexual intercourse was associated with earlier parenthood. In addition, early sexual intercourse was also associated with education levels and contraception use, which were both independently associated with earlier onset of parenthood. These findings were found to be consistent for both males and females in the sample. This study highlights the complex multifaceted relationship between variables that are predictive of an earlier onset of parenthood.

Substance use including alcohol and illicit drugs was associated with earlier onset of parenthood in both males and females (Archibald, 2004; Pears et al., 2005; Thornberry et al., 1997). In a qualitative study of an indigenous sample in Canada contrasting the findings in an Inuit community to the Pauktuutit study, Archibald (2004) identified differences in views of

alcohol and drugs on early onset of parenthood. In the Pauktuutit study, alcohol and drugs were reported as the most common reason for teenage pregnancies; however, in the Inuit sample only a few respondents recognised drugs and alcohol as having an influence on earlier onset of parenthood. As these studies were qualitative, there are very few measures to validate the impact of drugs and alcohol within each of these communities.

In a prospective study of adolescent pregnancy, Hockaday et al. (2000) found alcohol use to be associated with adolescent pregnancy, which is consistent with literature that supports the theory of a positive relationship between alcohol use and sexual activity that results in adolescent pregnancy (Donovan & Jessor, 1985; Harvey & Spigner, 1995; Hockaday et al., 2000; Luster & Small, 1994). Despite, these findings being focused on pregnancy rather than parenthood itself, it does provide evidence that substance use, particularly alcohol is associated with pregnancy, which obviously leads to parenthood in most cases, and therefore these associations should not be discredited.

Using data from the CHDS, adolescent substance use including tobacco, alcohol and cannabis were identified as significant covariates in predicting the early onset of parenthood and subsequent life course outcomes (Fergusson et al., 2012; Gibb et al., 2014). However, it should be noted that in a study by Gibb et al. (2014), the authors observed significant differences in tobacco and alcohol use when predicting early motherhood, although the authors did not observe a significant difference in cannabis use between young mothers and non-mothers. Based on these findings, there is evidence to suggest that to some extent substance use behaviour is predictive of an earlier onset of parenthood.

Antisocial behaviour in the form of aggression and contact with police was consistently associated with the onset of parenthood for males (Pears et al., 2005; Sigle-Rushton, 2005; Thornberry et al., 1997) and females (Miller-Johnson et al., 1999; Underwood et al., 1996). In two studies of female samples, Miller-Johnson et al. (1999) and Underwood

et al. (1996) found that teenagers who were more controversial and aggressive were more likely to become young mothers and have more children younger than non-aggressive girls. In research complementary to these studies, aggressive antisocial behaviour has also appeared as a prominent predictive factor of earlier onset of fatherhood (Pears et al., 2005; Sigle-Rushton, 2005; Thornberry et al., 1997). Consistent findings across male and female samples suggests that aggression and violence are associated with increased likelihood of earlier parenthood.

Using data from two prominent longitudinal birth cohort studies in New Zealand, Bardone et al. (1996) and researchers in multiple CHDS publications (Boden et al., 2008; 2012; Gibb et al., 2014; Marie et al., 2011; Woodward et al., 2006; Woodward et al., 2001) identified that conduct disorder during adolescence was associated with an earlier onset of motherhood. In Bardone et al. (1996), women who reported higher conduct-disordered problems in adolescence were four times more likely to become a mother by age 21 than their peers who reported no disorders. Likewise, in one of the CHDS publications, Boden et al. (2008) reported that conduct problems were significantly associated with motherhood by age 18 and 21 when compared with non-mothers by 21. As neither of these studies was directly examining the role of conduct disorder on early parenthood, the strength of this association requires further exploration.

Equally relevant are studies identifying that antisocial peers are also predictive of an earlier onset of parenthood. The form of antisocial peers varies across studies, ranging from deviant or delinquent peers to gang membership (Gibb et al., 2014; Pears et al., 2005; Thornberry et al., 1997; Underwood et al., 1996). With that relationship in mind, it should be noted that additional studies have also identified that aggressive behaviours and antisocial peers are independently associated with early parenthood as well as being associated with each other (Mayeux & Cillessen, 2008; Pattiselanno et al., 2015). Based on these findings it

is possible to suggest that these groups of peers may also have different aspirations for education, career, and parenthood than non-aggressive, pro-social peer groups. However, to my knowledge, no such research exists to identify this relationship.

A small selection of individual characteristics regarding behavioural problems and puberty were identified by the CHDS as factors associated with the earlier onset of parenthood. Unlike previous papers, the CHDS did not identify aggression or violence as being associated with the earlier onset of parenthood. However, greater novelty seeking and neuroticism were identified as being associated with earlier onset of parenthood (Boden et al., 2008; Fergusson et al., 2012; Gibb et al., 2014; Marie et al., 2011; Woodward et al., 2006; Woodward et al., 2001). These factors may not be direct measures of aggression and violence, but they are an indication that behavioural problems are associated with earlier onset of parenthood – an aspect of adolescent behaviour that requires further exploration.

Finally, the relationship between depression and early motherhood has yielded mixed results. An intergenerational long-term follow-up of black New Haven women who were women in the late 1960s (generation one) identified that the second generation of young mothers reported depression prior to the onset of earlier parenthood, which persisted throughout their life (Horwitz et al., 1991). When examining drug use and other determinants of premarital pregnancy and parenthood in a sample of 706 young women. Yamaguchi and Kandel (1987) identified that most covariates predictive of pregnancy were also predictive of outcomes. However, these authors found that depression was not predictive of pregnancy, but they did note a non-significant marginal effect whereby depressed adolescents were likely to experience an abortion. The retrospective nature of these studies led Miller-Johnson et al. (1999) to argue it is difficult to disentangle if the symptoms pre-dated motherhood; this led the authors to directly assess if depression is a predictor of teen childbearing using a longitudinal sample of 308 African American females. The sample were followed from third

grade through to young adulthood. Miller-Johnson et al. (1999) reported that teenagers who were depressed in middle adolescence were also more likely to become younger mothers. These findings were further supported in two longitudinal birth-cohort studies based in New Zealand, which both identified that depression during adolescence was associated with an earlier onset of parenthood (Bardone et al., 1996; Boden et al., 2008). Since longitudinal studies have the advantage of measuring symptoms prior to parenthood, there is evidence indicating that depression during adolescence will increase the likelihood of an earlier onset of parenthood.

3.1.2 Factors Predictive of Delayed Parenthood

Over the past few decades, there has been an increase in people choosing to delay parenthood within the western world. As noted in Chapter 2, this is evident in New Zealand where the median age of both mothers and fathers increased between 1980 and 2018 (from 25.7 to 30.5 years and 28.5 to 32.4 years respectively; Statistics New Zealand, 2019b). The primary concern of delayed parenthood is its potential impact on wider society. According to Khawaja et al., (2006), delays in parenthood are a contributing factor to the decline in fertility rates of New Zealand, which are heading to below replacement level (see Chapter 1 for details). Therefore, it can be concluded that due to potential future impacts of delayed parenthood and the increasing trends of delayed parenthood in New Zealand, there is value in understanding the factors associated with delaying parenthood and how this may vary by gender or ethnicity.

Unlike the wide range of studies into the early onset of parenthood, research specifically focused on identifying factors associated with the delayed onset of parenthood using predictive models is scarce. Instead, the literature identifying factors associated with delayed parenthood is predominantly descriptive or based on historical event analysis, each of which yields its own limitations. Despite the scarcity of robust literature, there is some

evidence to suggest that delayed onset of parenthood is not due to the inverse of factors associated with earlier onset parenthood. Instead, delayed onset of parenthood is recognised as being associated with changes in western society and values regarding contraception, intimate relationships, and women's role in both the workforce and education. Since the factors associated with delayed onset of parenthood are also multifaceted, each of these aspects will be discussed separately below.

3.1.2.1 Historical Changes Contributing to Delaying Parenthood

With each generation there have been cultural changes in reaching milestones such as children leaving home and getting married later in life than their parents (Mills et al., 2011; Schmidt et al., 2012). However, historical changes in values and attitudes have had positive impacts on women's autonomy regarding timing of parenthood. Across many western countries including New Zealand, there has been the legalisation of abortion; greater access to contraception, which contributed to women's sexual liberation during the 1960s to 1980s; and a rise of assisted reproductive treatments within mainstream society within the past decade (Dickson et al., 2000; Khawaja et al., 2006; Schmidt et al., 2012; Sobotka, 2010). Across history, social and cultural norms have developed in ways that have allowed greater sexual freedom and fertility autonomy for women, which is believed to have contributed to the trend in delayed parenthood in the western world. Despite the rise in contraception use and reproductive assistance, it should be noted that there is little (if any) research that directly examines the relationship between contraception and delayed parenthood. The relationship is commonly inferred through historical trend analysis that observed a global rise in contraception use coincideing with increased rates of delaying parenthood (Botting & Dunnell, 2000; Mills et al., 2011; Schmidt et al., 2012). It should be considered that the use of contraception itself therefore may not be the cause of delayed parenthood. Instead it may be due to changes in cultural values regarding parenting, timing of parenthood and an increase in

women's autonomy to choose when to transition into parenthood. Furthermore, there is little or no research identifying the impacts of social changes on men's patterns of fertility.

3.1.2.2 Education

Over the past few decades, the increase in delayed parenthood has coincided with a rise in the proportion of both men and women undergoing tertiary education. With research findings indicating that educational attainment has a delaying effect on the onset of parenthood (Blossfeld & Huinink, 1991; Marini, 1984; Martin, 2000; Ravanera & Fernando, 2004; Rindfuss & Brauner-Otto, 2008; Schmidt et al., 2012; Sobotka, 2010; Wilkie, 1981). From an economic and career perspective, delaying the onset of parenthood can be understood as a rational strategy to accumulate resources (Kravdal, 1994). This generally consists of individuals spending greater time obtaining higher education to improve their employment opportunities and increase the likelihood of economic stability prior to having children. The impact of attaining higher education prior to becoming a parent may be greater for women, as this period often coincides with the "optimal" biological period to have children (Mills et al., 2011; Schmidt et al., 2012; Sobotka, 2010). Due to the lack of research examining education and delayed parenthood for both men and women, further research is required. This is to examine whether the pursuit and attainment of higher education has a greater impact on the onset of parenthood for women than men.

Alternatively, Ravanera and Fernando (2004) proposed that delayed parenthood is associated with social class values. In a study of men, the authors identified that men belonging to a higher social class are more likely to conform to a normative life course pathway (*graduation → work → marriage → fatherhood*), resulting in later parenthood; whereas men belonging to a lower social class followed an alternative pathway (*work → marriage → fatherhood*) resulting in earlier parenthood than those in the higher social class. The authors suggested that social class values influence attitudes towards

education and timing of parenthood. However, for higher social class men the time spent pursuing and attaining tertiary education qualifications was identified as a primary factor contributing to the delay in fatherhood. Regardless of whether delayed parenthood is due to social class value towards education or a rational strategy from an economic and career perspective, it is evident that the pursuit and attainment of tertiary education qualifications is a contributing factor to delayed parenthood.

Based on the limited research conducted in the role of educational attainment in delaying the onset of parenthood, there is consistent evidence to suggest that time spent attaining qualifications is likely to delay parenthood for both males and females. However due to the lack of research in this area, further investigation is warranted into the extent of this relationship and how this differs with gender.

3.1.2.3 Employment

Education often plays a role in employment and career trajectories. Like education, employment has been identified as a contributing factor to delayed parenthood. However, the effects for men and women appear to be slightly different. This may be due to differences in optimal biological periods to transition into parenthood, and the impact of childbearing on career advancement.

As previously mentioned, there is an economic rationale for women to delay childbearing to reduce opportunity costs in their employment tenure, work experience and related skills. This is best explained by two economic theories. The first is a new home economic theory by Kravdal (1994). It has been recognised that lower birth rates are associated with the higher earning capacity of women. Using this new home economic theory, Kravdal (1994) indicated that time is a scarce resource that needs to be allocated by women. In this case, women are choosing to allocate their earlier years to their careers and personal advancement rather than childbearing. The second economic theory, from Taniguchi

(1999) centres on opportunity costs and reflect women's choices between motherhood or other opportunities. It notes that women allocating time during their earlier years to their career and upskilling allows an opportunity to accumulate wealth and financial assets before taking on family responsibilities. It also reduces the opportunity costs relating to income loss or skill depreciation if they choose to have a child during these same years (Blackburn et al., 1993; Kravdal, 1994; Schmidt et al., 2012; Taniguchi, 1999). Therefore, women who invest their optimal biological years in career advancement are more likely to be in higher earning categories and occupational positions. This is evident in England, Wales and France, where women in higher earning categories or occupational positions were more likely to postpone childbearing to upskill and accumulate material resources. Yet despite women being more financially independent, it is also viewed negatively because these delays in childbearing are also identified as contributing to the decline in rates of fertility in these same areas (Berrington, 2004; Schmidt et al., 2012; Toulemon, 2005).

In contrast, the onset of parenthood is less physically burdensome on men and therefore they are less likely to experience the same opportunity costs as women. Like women, men also have an economic rationale associated with the delayed parenthood. Using investment theory, Ravanera and Fernando (2004) suggested that the timing of parenthood is influenced by social class values relating to education and employment as a means of investing in their future; financial security and higher earning potentials influenced decisions on childbearing as these were associated with greater delays in childbearing. The authors also found that higher income for lower social class men earlier in life is also associated with an earlier onset of fatherhood. The findings suggest that since men are less likely to experience the same opportunity costs as women when transitioning into parenthood, they are capable of investing in their families at an earlier age and are more likely to transition into parenthood earlier rather than delay. Despite differences in potential opportunity costs for men and

women, there is evidence to suggest that the role of employment, earning potential and financial security all influence the timing of parenthood, regardless of gender, although it should be considered that the underlying economic rationale for delaying parenthood may be slightly different for men and for women.

3.1.2.4 Relationships

Over the past few decades, researchers have observed delays in milestones that affect the timing of parenthood, such as completion of education, leaving the family home and, importantly, forming a relationship (Billari et al., 2006; Sobotka, 2010). These changes in family values have seen declines in marriage rates, a rise in divorce rates and greater non-traditional living arrangements, which all contribute to variations in the timing of parenthood (Cribb, 2009; Families Commission, 2008; Lesthaeghe, 1995; Mills et al., 2011; Ravanera & Fernando, 2004; Schmidt et al., 2012; Thornton & Young-DeMarco, 2001).

The formation of a relationship is important to consider because relationships formed earlier in life have higher dissolution rates than those formed later in life (Schmidt et al., 2012; Wilson & Smallwood, 2008). In a literature review, Schmidt et al. (2011) suggested that parents who delay are more likely to be in a stable relationship and desire children than younger parents. Indicating that trying to find the right partner contributes to delaying the onset of parenthood. In the study by Ravanera & Fernando (2004), social class values and timing of marriages influenced the timing of parenthood. Unlike Schmidt et al., these authors identified that both higher and lower social class men were likely to form relationships and marriages before having children. Higher social class men often formed relationships and marriages later in life after attaining their education and forming their career. Whereas lower social class men often started their careers younger and thus formed relationships and began their families earlier than higher social class men. However, it should be noted that forming a relationship and getting married is not necessary to become a parent. Additional research

indicated that men did not require marriage or a stable relationship to become a father (Astone & Peters, 2014; Ravanera & Fernando, 2004). Based on these findings, it would seem relationships and the role of a partner are vital factors for those actively planning on having children. it should be noted, however, that due to the lack of research in this field, whether the association between relationship formation and delayed onset of parenthood is consistent or inconsistent across gender is unknown. Thus, further investigation is warranted into gender differences in the role of relationships in delayed onset of parenthood.

3.2 The Relationship between the Onset of Parenthood and Life Course Outcomes

The transition to parenthood is a significant life event that can contribute to both advantageous and disadvantageous life outcomes for both males and females (Astone & Peters, 2014; Boden et al., 2008; Carlson, 2011; Falci et al., 2010; Furstenberg et al., 1987; Gibb et al., 2013; Gibb et al., 2014; Gibb et al., 2015; Hobcraft & Kiernan, 2001; McMahon et al., 2011; Moffitt et al., 2002; Nomaguchi & Milkie, 2003; Woodward et al., 2013). Previous research is disproportionally focused on younger parents, due to an emphasis on understanding the potential role of the onset of parenthood in initiating pathways towards disadvantageous outcomes in adulthood (Sigle-Rushton, 2005; Wellings et al., 1999).

Whereas literature examining the early onset of parenthood and life course outcomes often spans a range of topics from socio-economic, educational, physical, and mental health to name a few; literature relating to delayed onset of parenthood predominantly focuses on economic well-being, and health outcomes for the mother and her offspring (Hobcraft & Kiernan, 2001; Lansac, 1995; Nilsen et al., 2012; Spence, 2008). An overview of the literature specifically related to the outcomes measured in this dissertation will be provided below. As mentioned previously, the outcomes can be broadly categorised into the following five domains: family resources, education, household composition, psychosocial well-being, and mental health. Each of these domains is discussed below in more detail. Due to a lack of

research conducted on older parents a large proportion of the literature discussed is on younger parents, including possible outcomes related to delayed parenthood. Furthermore, any research that has identified gender differences in outcomes will also be specified where relevant.

3.2.1 Family Resources

There is a strong emphasis in the literature to examine socio-economic well-being as an outcome for parents. Since the majority of the literature is based on young parents, there is an underlying tone in the literature focusing on the socio-economic disadvantage of young parents. This is evident in studies identifying associations between early onset of parenthood and employment and educational opportunities (Assini-Meytin & Green, 2015; Williams et al., 1997; Zeck et al., 2007). In addition to focusing on the outcomes of the individual parent, this research will extend existing literature, including family resources. The outcomes of interest include homeownership, socio-economic status, family income and material wealth, each of which will be discussed below.

3.2.1.1 Home Ownership

Home ownership is often considered the pinnacle of housing success (Mills et al., 2011; Moffitt, 2002; Moffitt et al., 2002; Wellings et al., 1999). This is reflected in the values of New Zealand, where homeownership is emphasised as a successful life outcome because property is considered a primary source of family wealth (Ministry of Social Development, 2004). As a measure of family wealth, differences in the timing of parenthood and home ownership should be examined. In a study of women who bore twins in England and Wales between 1994 and 1995, Moffitt (2002) found that, compared to older mothers, a substantially larger proportion of young mothers did not own their own home. However, these findings should not be generalised to suggest that young parents are less likely to be homeowners, because these findings were based on a short follow-up period of five years

after birth and the study did not examine the factors that contribute to these differences. In contrast, a study by Mills et al. (2011) sought to understand the economic relationship with home ownership for younger parents in Italy and the Netherlands. Consistent with the literature, the authors found that younger parents did have lower rates of home ownership, although it was mainly linked with being in a poor economic position and difficulty in securing a mortgage. When examining the relationship between the timing of parenthood and home ownership, additional, later life course factors should be taken into consideration. These may include level of employment, employment stability, relationship stability and financial wealth. Considering little or no research has been conducted to understand the underlying mechanisms that decrease rates of home ownership among younger parents, these life course factors are merely speculative. Furthermore, no literature identified any gender differences in outcomes and hence the need for research to be conducted into the association between the onset of parenthood and homeownership and whether this varies by gender.

3.2.1.2 Socio-economic Status

Socio-economic status and social class reflect a family's ability to access resources (Pears et al., 2005; Ravanera & Fernando, 2004). The measures of socio-economic status and well-being vary across studies to include levels of education, employment, welfare, and poverty (Assini-Meytin & Green, 2015; Williams et al., 1997; Zeck et al., 2007). Despite differences in how socio-economic status is measured throughout the literature, there is clear and consistent evidence indicating that compared with older parents, young parents are more likely to experience socio-economic disadvantage. In some studies, this disadvantage persisted until the age of 40 or older (Assini-Meytin & Green, 2015; Hofferth, 1984), with one study identifying that teenage mothers persisted in being more socio-economically disadvantaged than teen fathers when matched on family background characteristics to non-teen parents (Assini-Meytin & Green, 2015). This follow-up study did provide insightful

differences regarding gender differences; however, further investigation is required to validate these findings.

Equally important to note are the findings by Nisén et al. (2019) who, as in previous studies, found that older parents are more likely to experience socio-economic advantage than younger parents. The authors suggested the advantage associated with delayed parenthood is not attributed to the delay itself but rather the time spent accumulating wealth and resources and advancing their career during the delay period. Research examining the pathway explaining the relationship between early parenthood and adverse socio-economic outcomes identified a range of attenuating adulthood factors. Two such studies by Williams et al. (1997) and Zeck et al. (2007) identified that younger parents are not destined to experience socio-economic adversity, and by continuing with education and gaining employment, young parents particularly mothers, are able to improve their socio-economic outcomes and well-being. In addition to those factors, Zeck et al. (2007) also noted that parental and childcare support did play a pivotal role in allowing women to return to education and employment, which improve their socio-economic standing.

3.2.1.3 Family Income

The primary economic focus of parental research is based on individual income. Research has indicated that in addition to younger parents earning less, women are also more likely to be financially disadvantaged than men (Williams et al., 1997). However, this is more likely to be due to gender differences in distribution of time allocated in domestic work and childcare (Barnes, 2015; Gibb et al., 2014; Gibb et al., 2013; Joshi, 2002; Robinson, 1988). In addition to lower personal income, lower family income has also been reported as being associated with the effect of early parenthood in samples of women (Boden et al., 2008; Hobcraft & Kiernan, 2001). Boden et al. (2008) were able to identify socio-economic status

at birth and scholastic performance during adolescence as partially explaining the adverse family income for young mothers.

Conversely, an inverse effect was identified for those who delayed childbearing (Hofferth, 1984; Nisén et al., 2019). In a study by Hofferth (1984) the authors found that by the age of 60, women who delayed childbearing were more likely to experience advantageous economic outcomes, including higher family income. The authors indicated this difference is more likely to be attributed to accumulation of resources and spending more hours working than their peers as well as the smaller number of children in the household. Likewise, in a large longitudinal study based in Finland, using time constant and time-varying confounding factors, Nisén et al. (2019) identified that teen parents have lower income. The authors noted that income and participation in the labour force was mediated by the delay in parenthood itself as well as by educational attainment. As Nisén et al. (2019) is the only study that has provided the ability to use time constant and time-varying confounding factors, further studies using longitudinal research to examine similar relationships for additional outcomes would be useful.

3.2.1.4 Material Well-being

The material well-being of a family often reflects differences in the family's economic situation and ability to access and provide resources. To date very few studies have examined material well-being of parents as a direct measure. Hobcraft and Kiernan (2001) identified that, in addition to young mothers having a lower income, they were also more likely to lack material resources such as a telephone. The authors recognized that material well-being and access to resources was important because it was associated with other outcomes including social connectedness. This highlights the multifaceted relationship between outcomes, as they often interact with each other. This complex relationship is more prominent later when discussing psychosocial well-being and mental health of parents.

When material well-being was measured as a direct outcome, Geronimus and Korenman (1992) argued that the previous literature had overstated the consequences of teen parenthood. Using three cross-sectional studies to estimate relationships, the authors found relationship status, education and employment were associated with differences in material well-being for younger and older mothers. Similarly, Hofferth (1984) identified that the disparity in material well-being between younger and older parents remained persistent until the age of 60. The primary factors that contributed to better material well-being were employment status, time spend in the labour force, family income and the number of children. This led the authors to suggest that the advantageous position of older parents is attributed to time spent advancing careers and accumulating resources. Although research in this field is scarce, there is strong evidence to suggest the timing of parenthood is associated with different levels of material well-being. Yet the role in which life course factors contribute to these differences requires further investigation.

In addition to measures of economic or material well-being, it has been suggested that consideration should be given to other forms of well-being, like cultural well-being (Reid et al., 2016) – an aspect in the literature that is yet to be investigated.

3.2.2 Education

Understanding the association between the onset of parenthood and educational outcomes is important, because, as briefly mentioned, education has been identified as a key factor in improving the outcomes of younger mothers, whether it be by improving socio-economic status (Williams et al., 1997), coming off welfare (Harris, 1991) or improving employment opportunities (Zeck et al., 2007). Yet there is ample evidence to suggest that an earlier onset of parenthood results in young parents having lower levels of education than their peers and older parents (Boden et al., 2008; Card & Wise, 1978; Fergusson & Woodward, 2000; Kravdal, 1994). Research into the direction of the effect between

parenthood and education has yielded mixed results. Cohen et al., (2011) suggested that the effect of the onset of parenthood may be stronger than the effect of education on fertility in women. However, investigations examining the direction of this relationship, especially in men, are lacking.

In two studies examining levels of educational attainment between the ages of 30 and 40, it was observed that young mothers had significantly lower levels of educational attainment, if any were attained at all (Assini-Meytin & Green, 2015; Hobcraft & Kiernan, 2001). Based on the findings, it was argued that even when accounting for adverse childhood and adolescent factors, significant differences in educational attainment remained. This suggested that the timing of parenthood may contribute to differences in educational attainment. In addition, the authors also identified a gender difference, whereby fathers had reportedly higher levels of educational attainment than mothers. However, they did not identify which factors directly contributed to this difference between males and females beyond parental involvement in childrearing practices. This is further supported by the work of Mollborn (2007, 2010) which identified that varying levels of parental involvement with the child, engagement in employment and mothers receiving support with childcare all contributed to differences in young mother's and fathers' educational attainment. Due to gender differences in educational attainment, it is evident that research examining the factors associated with disparities in educational attainment is vital to improve outcomes for not only younger parents but also women. This is further emphasised by research recognising that educational attainment improved one's economic position (Nisén et al., 2019).

3.2.3 Household Composition

The timing of parenthood has the potential to affect household composition, including the formation of relationships and whether households are crowded.

3.2.3.1 Partner Relationship

Partner relationship status is recognised as being a predictive factor in the onset of parenthood as well as a measure of life course outcome. As previously mentioned, delaying childbearing is often associated with partner selection and relationship formation (Kneale & Joshi, 2008). However, the timing of parenthood has also been identified as being associated with differential partner relationship outcomes. Various research has reported that younger parents are more likely to separate from their original partner and despite some forming new partnerships, many end up as sole parents (Buvinic, 1998; Furstenberg et al., 1987; Hansen, 2012; Hobcraft & Kiernan, 2001; Kellam et al., 1982; Maynard, 1996; Schmidt et al., 2012; Taylor, 2009; Williams et al., 1997; Woodward et al., 2013; Woodward et al., 2001; Zeck et al., 2007). These findings are consistent in samples of mothers in Minnesota (Falci et al., 2010), and in England and Wales (Schmidt et al., 2012). However, it is not thought that the onset of parenthood is the direct cause for higher dissolution rates among younger parents, despite research indicating that relationships formed earlier in life have higher dissolution rates regardless of parenthood (Schmidt et al., 2012; Wilson & Smallwood, 2008). Findings by Woodward et al. (2001) may suggest that an intergenerational effect of a lack of stable parental relationship role models among younger parents may attribute to higher rates of single parents. This relationship is merely speculation, as the authors did not directly assess the role of parental role models on relationship status. Instead it is based on observations that young parents in the cohort are often raised in single-parent households and go on to be single parents themselves. Equally important to note is that young parents are not a homogenous group, destined to end up alone later in life. This is reflected in work by Buvinic (1998) who cross-compared samples from four studies in Barbados, Chile, Mexico and Guatemala and found that adolescent mothers were no more or less likely than adult mothers to remain married later in life.

Based on the literature, there is clear evidence to suggest that the timing of parenthood differs in regard to relationship formation (Hansen, 2012; McAnarney & Hendee, 1989; Williams et al., 1997). Relationship status of parents is often reported as either a characteristic or explanatory factor for other life course outcomes. For example, in a sample of young mothers, McAnarney and Hendee (1989) found that marriage had a positive effect in improving the mothers' economic position. As little is known about the explanatory factors for the association between the onset of first parenthood and relationship formation in explaining the higher dissolution rates in younger parents' relationships, further investigation is warranted (Wilson & Smallwood, 2008). One potential explanation may be attributed to younger parents reporting higher rates of relationship dissatisfaction (Hansen, 2012; Williams et al., 1997; Woodward et al., 2001) and that partners were likely to be less reliable or more abusive (Hansen, 2012; Moffitt, 2002; Williams et al., 1997; Woodward et al., 2001).

In summary, younger parents were less likely to be in a steady relationship later in life, although a few researchers propose that this is not a direct result of the timing of parenthood but rather other external factors that are not directly measured or reported in the literature.

3.2.3.2 Household Crowding

When examining household composition, research often examines the number of biological children and family sizes (Buvinic, 1998; Corcoran, 1998; Didham & Boddington, 2011; Falci et al., 2010; Joffe et al., 2009; Rawiri, 2007); however, this research will focus on household crowding. Despite limited research, there is some evidence to suggest that younger parents continue to experience adversity regarding household crowding. Moffitt (2002) found in a study of mothers with twins; that younger mothers were more likely to live in crowded housing. However, when examining the perception of household crowding, studies found that about one-third of younger and older mothers self-reported that their households felt

crowded, which the authors suggested may be due to the nature of being in a household with twins. In a qualitative study, respondents from an Inuit community reported that overcrowding was an issue that was particularly associated with teenage pregnancy (Archibald, 2004). A limitation of the qualitative research is the inability to identify factors contributing to the higher rates of household crowding among the teenage mothers in the Inuit communities. Furthermore, Morrison (1994) reported that between 1976 and 1981 there was a decline in household crowding, which was attributed to increases in the average dwelling size. However, during this time, for Māori and Pacific households, crowding increased. Similar findings have also been observed with the Aboriginal population in Canada (King et al., 2009). Household crowding is a topic of interest because it has the potential to affect the health of occupants, including parents and children. Research has shown that overcrowding is associated with minimising housing quality and increases stress and health issues, especially for children. This is of particular interest in New Zealand, as minority groups including Māori and Pasifika report higher rates of overcrowding combined with respiratory difficulties and illnesses including colds, asthma and influenza (Families Commission, 2008; Gracey & King, 2009; Gray, 2001; Ministry of Social Development, 2004). Thus, household crowding is of interest due to its potential to vary across sub-populations of parents and put certain groups at increased risk of adverse outcomes; this has yet to be examined thoroughly.

3.2.4 Psychosocial Well-being

There is a common belief that parenthood is associated with changes in happiness, purpose, and life satisfaction (see Hansen, 2012, for discussion). Therefore, literature relevant to this dissertation examining the relationship between the onset of parenthood and psychosocial well-being outcomes will be discussed below.

3.2.4.1 Life Satisfaction

For many parents, the transition into parenthood can be a happy time; however, studies analysing life satisfaction have yielded mixed results. For example, according to Hansen (2012) and contrary to popular belief, childless people reported higher life satisfaction than parents, suggesting that parenthood diminishes life satisfaction. In contrast, in a study of men based in the Netherlands, Dykstra and Keizer (2009) found childless men and fathers reported similar levels of life satisfaction. These conflicting findings are surely due to differences in sample size and methodological design. However, due to the lack of research in the domain of life satisfaction in parents, there is no strong evidence to suggest that parenthood leads to increased or decreased life satisfaction.

There is some evidence to suggest that younger parents usually report lower levels of life satisfaction (Mastekaasa,1994). Sigle-Rushton (2005) found that young fathers were more likely to report lower life satisfaction; however, when they were matched on family and personal background characteristics, this difference was borderline significant. In addition, Knoester and Eggebeen (2006) found that as children increased in age, so too did the reporting of life satisfaction for fathers, suggesting that changes in life stressors and childrearing responsibilities contribute to increasing life satisfaction. Likewise, studies consisting of mothers commonly found the association between the timing of motherhood and life satisfaction to be partially explained by a range of life events. Younger mothers reported lower life satisfaction; however, this was partially explained by childhood poverty (Hobcraft & Kiernan, 2001), social support (Stevenson et al., 1999), and susceptibility to life stressors (Schmied et al., 2013). Based on these studies, it is evident that there is a relationship between the onset of parenthood and life satisfaction, whereby younger parents are less satisfied. However, it is evident that life satisfaction is a dynamic variable that changes throughout life and is partially influenced by the parent's social environment,

personal situation, and general life stressors. Considering that cross-sectional and retrospective studies are incapable of assessing a time-dynamic relationship, there is a need for longitudinal data to assess the relationship between onset of parenthood and the time-dynamic nature of life satisfaction.

3.2.4.2 Self-esteem

Various studies have examined the association between self-esteem and the timing of parenthood as well as life course outcomes (Hockaday et al., 2000; Thornberry et al., 1997; Van der Klis et al., 2002; Zhang & Chan, 1991). Self-esteem, like other measures of psychological well-being, has a complex relationship with parenthood. For example, in a qualitative study of young mothers in Inuit communities (Archibald, 2004), teenage mothers reported that after transitioning into parenthood there were emotional challenges that resulted in lower self-esteem. However, for some young mothers, their self-esteem improved as a form of personal growth because they were able to develop both their confidence and self-esteem when overcoming challenges. The relationship between parents' self-esteem and additional factors is not only evident in the work by Archibald (2004). Within the literature there is strong evidence to suggest that self-esteem both influences and is influenced by a range of psychological and social well-being factors including social support, depression, stress and anxiety (Collins, 2010; Weed et al., 2000; Whitley & Kirmayer, 2008; Zhang & Chan, 1991). Thus, it can be suggested that to some extent there is a relationship between the onset of parenthood and self-esteem that is interrelated with other forms of psychological well-being outcomes, as evidenced in the literature examined below.

In a study examining parental status and adult well-being that included self-esteem, Nomaguchi and Milkie (2003) reported that no direct association was observed between parental status and self-esteem, although unmarried mothers and fathers were associated with reduced levels of self-esteem among parents. This study was further refined by Woo and

Raley (2005) who recognised that marital status (e.g. married or unmarried) did not represent non-married couples who were cohabitating. When examining reported self-esteem across waves 1 and 2 in the study, Woo and Raley found that self-esteem varied between men and women, depending on whether they were a new parent, their cohabitating status and mental health. The authors did note that due to the sample size they were unable to examine the dynamic relationships any further. Furthermore, in studies comprising female samples, there is ample evidence to support the multifaceted relationship between parenthood and self-esteem which both influences and is influenced by a range of psychological and social well-being factors. Samuels et al. (1994) reported that social support indirectly enhanced self-esteem for young mothers by helping with adjustment to parenthood and other life aspects. Similarly, Collins (2010) identified that working with mothers and providing support to achieve goals contributed to improving self-esteem. Furthermore, for some women who have poor and disadvantaged situations, becoming a mother may provide a valued identity that improves self-esteem (Breheny & Stephens, 2008).

Based on the literature reporting self-esteem, there is evidence to suggest there is a complex multifaceted relationship between the timing of parenthood and self-esteem. This is due to self-esteem being associated with an array of factors including forms of support, marital status, resources, mental health, and personal situation. Because measuring the association between parenthood and adult psychological well-being has only become common over the past few decades, there is clearly a need for more research to be conducted to understand the complex relationship.

3.2.4.3 Social Support

Based on the literature discussed above, there is evidence to suggest that parental support is associated with an array of life course outcomes. From a resiliency perspective, social support can be pivotal in buffering any negative effect. It has been recognised that

social support helps develop resiliency when young parents experience the adverse situations and challenges associated with parenthood (Brown, 2011; Bunting & McAuley, 2004; Collins, 2010; Samuels et al., 1994; Wolkow & Ferguson, 2001). In studies of women, there is evidence to suggest social support is vital during pregnancy to increase the potential of advantageous outcomes regarding education, life satisfaction and decreasing depression and anxiety (Rawiri, 2007; Stevenson et al., 1999). When examining social support as an explanatory factor for differential outcomes, Wolkow and Ferguson (2001) noted that social support is a time-dynamic variable. Support can be introduced into a person's life at any stage to act as and compensate for lack of other protective factors. Based on this research, it is evident that social support can be an important factor for improving outcomes for young parents.

The literature examining social support as a direct outcome is scarce. However, as previously mentioned, social support is measured as an intervening variable in many other outcomes. The most prominent area of literature where it is referenced is mental health (Aitken et al., 2016; Bradley & Slade, 2011; Cox, 1972; Hudson et al., 2000; Panzarine et al, 1995; Turner et al., 2000). In particular, lower social support was associated with increased reporting of depression in a sample of males (Bradley & Slade, 2011) and females (Hudson et al., 2000). In the study of Hudson et al. (2000) the authors did suggest that the demands of motherhood does not leave a lot of time or energy to maintain other relationships, which may contribute to the weaker social support. However, there is also evidence to suggest that depression can also influence the perception of social support. Panzarine et al. (1995) found that when social support was measured by depressive symptoms in a sample of young mothers, there were no differences in the size of networks or frequency of support received; however, mothers who reported more severe depressive symptoms were less satisfied with the support they received. These studies indicate that when assessing the relationship between

the timing of parenthood and social support networks, careful consideration must be given to other psychological factors.

Within the limited research where social support is examined as an outcome, the findings are not always consistent. There is some evidence to suggest there is no difference in levels of social support for younger and older mothers (Taylor, 2009), sole parents and non-parents (Kellam et al., 1982) or between parents who had planned and unplanned pregnancies (Su, 2012), whereas in a longitudinal study of mothers with twins, Moffitt (2002) identified differences in levels of social support, whereby older mothers had more support than younger mothers. The authors suggested that the differences in social support may reflect differences in neighbourhoods, relationships, networks and ability of friends or family to provide support. As previously mentioned, inconsistencies in literature can be a result of sample selection or methodological design, in particular, the inconsistency in how social support is measured across studies which includes family, whānau, friends, midwives, educational and official support programmes (Bunting & McAuley, 2004; Collins, 2010; Cox, 1972; Moffitt, 2002; Reid & Meadows-Oliver, 2007). A limitation of research on social support, like many of the outcomes already discussed, is a lack of literature on fathers. Thus, it is uncertain if parental support provides the same benefit for fathers as it does mothers and so requires further investigation.

3.2.5 Mental Health and Substance Use

There is strong evidence to indicate that the timing of parenthood is associated with mental health outcomes. In particular earlier onset of parenthood is associated with more mental health issues and problematic substance use (Boden et al., 2008; Bradley & Slade, 2011; De Genna et al., 2009; Hobcraft & Kiernan, 2001; Mirowsky & Ross, 2002; Moffitt, 2002; Williams et al., 1997). These findings are reflected in a longitudinal study of a community sample by Falci et al. (2010) which identified that younger parents (aged <20

years) reported more mental health problems than later parents and non-parents. When examining explanatory factors, the authors found that the number of traumatic events, educational attainment and employment status had no significant effect on young parents' depressive symptoms by age 29. Instead, marital status, financial strain due to fewer resources and diminished sense of personal control did have a significant effect on depressive symptoms. The authors also reported that although the earlier onset of parenthood may have negatively impacted mental health, on-time parenthood yielded no extra benefit. This suggests that the onset of parenthood itself may lead to increased mental health. Instead, mental health later in life may be attributed to later life course impacts.

In contrast, older parents who delayed the onset of parenthood were associated with advantageous mental health and substance use outcomes. These outcomes are often attributed to better adjustment, greater mental resilience than younger mothers, and advantageous characteristics associated with delayed parenthood, such as relationship status or economic position (De Genna et al., 2009; Falci et al., 2010; McMahon et al., 2011; Mirowsky & Ross, 2002; Robinson et al., 1988). Mirowsky and Ross (2002) reported older parents as having lower rates of depression, which was partially attributed to characteristics associated with delayed parenthood. These included marriage, higher education, and better employment. Furthermore, the authors did note a gender effect, whereby fathers benefited emotionally by the greater delay in parenthood. But the underlying factors that contribute to this difference were not identified. Based on the findings in the literature, there is some evidence to suggest that the timing of delayed parenthood does not directly impact mental health. Instead, delayed onset of parenthood is reflective of advantageous outcomes that are associated with improving mental health.

Of the few studies that examined gender, two identified gender differences in alcohol use. Little et al., (2009) found that amongst adolescent parents' gender moderated alcohol

consumption. Authors observed a rise in alcohol consumption for men after they became parents, but women's alcohol consumption after parenthood did not change. When the role of being a custodial parent was taken into consideration, Fergusson et al. (2012) found that being a custodial parent mitigated substance abuse/dependence for mothers, and being a custodial parent resulted in a slightly larger reduction in alcohol abuse/dependence for women than it did for men. As there are relatively few studies including older parents that have examined the relationship between the onset of parenthood and mental health or substance use as an outcome, further investigation is warranted. Since longitudinal studies often collect data both prior to the onset of parenthood and outcomes later in life, they provide an opportunity to disentangle the effects of the timing of parenthood and early life course factors for later life course outcomes.

Overall, based on the literature, it is evident that the association between the onset of parenthood and mental health and substance use is attenuated by a range of social, personal, and environmental factors that can change over time (Boden et al., 2008; De Genna et al., 2009; Zuckerman et al., 1987). An example of this is reported in the Williams et al. (1997) longitudinal study of women conducted over a 19-year period. Williams and colleagues found that found that psychological morbidity was relatively stable across the period examined. To elaborate, once early psychological symptoms and other life characteristics (e.g. child's age, relationship status and income) were taken into consideration, the timing of parenthood was no longer predictive of mental health. Instead, between the ages of 30 and 40, the role of partner relationships, financial position and children had a greater influence in predicting parental mental health than the onset age of parenthood, and therefore, the mental health or substance use of parents may not be attributed to the onset of parenthood itself. Instead differences in mental health are more likely to be attributed to advantageous or

disadvantageous outcomes throughout the life course commonly associated with either early or delayed onset of parenthood.

3.3 Summary of the Literature on Early and Delayed Onset of Parenthood including Differences Between Mothers and Fathers

3.3.1 Early Onset of Parenthood

There is clear evidence to suggest that findings are relatively consistent across studies, whether they be longitudinal, cross-sectional, qualitative or an event history analysis in design. With the exception of the few gender differences identified, consistencies have been observed in research over the past few decades both in single sex or mixed gender samples, both large and small. Based on consistencies in the literature, evidence suggests that the developmental pathway to earlier onset of first parenthood is multifaceted. The role of parental figures and family formation have constantly been identified as influencing early onset of parenthood. However, further investigation is warranted to understand whether these associations are due to parental figures being role models, educational supports or transmitters of cultural class or cultural values and attitudes that contribute towards early parenthood. Similarly, educational involvement or attainment is associated with an early onset of parenthood, yet whether this is reflective of future life goals or values or different life course pathway requires further exploration. Finally, the most consistent and robust finding throughout literature is the role of lower family socio-economic status or social class as predicting an earlier onset of parenthood. The relationships between parental figures, education and social class with an earlier onset of parenthood have led Ravanera and Fernando (2004) and Pears et al. (2005) to question whether these factors are predictive of earlier onset of parenthood, because they are more reflective of lower social class values or attitudes toward earlier parenthood. Due to limited research, further studies are required to understand the relationship between individual characteristics and behaviours as predictors of

early parenthood; longitudinal designs are therefore needed to measure potential predictor variations before the timing of parenthood, to disentangle the relationships and directions of any effects.

3.3.2 Delayed Onset of Parenthood

Unlike early onset of parenthood, there is no evidence indicating that childhood or adolescent experiences are associated with the delayed onset of parenthood. Instead, factors that are dynamic across the life course appear to be better predictors of delayed parenthood. Based on longitudinal studies and cross-sectional research, the factors associated with delayed parenthood include choices regarding education, employment, and partner selection beyond adolescence. However, due to the lack of research on delayed onset of parenthood, the extent of gender differences in predictive factors is inconclusive, and hence further research is required to understand if the factors predictive of delayed parenthood remain consistent for males and females. Furthermore, due to the scarcity of empirical literature regarding delayed onset of parenthood, evidence is lacking when considering the validity, robustness and generalisability of the findings reported above. Because delayed parenthood occurs later in life, the majority of the literature has focused on factors during adulthood. Furthermore, as cross-sectional research and age-specific cohorts do not accurately and reliably measure early childhood experiences, there is no certainty that childhood or adolescent environments do not influence delayed onset of parenthood. This gap in the research can be addressed with the use of the CHDS, which has prospectively measured factors from childhood through to adulthood that may be associated with delayed parenthood.

3.3.3 Summary of the Onset of Parenthood and Life Course Outcomes Including Differences Between Mothers and Fathers

At the bivariate level, it appears that an early onset of parenthood is predictive of disadvantageous outcomes across the domains previously mentioned. The differences

between early and delayed onset of parenthood is often reduced to non-significance when additional factors are taken into consideration. For younger parents, the disadvantageous outcomes have been associated with an accumulation of adverse experiences during childhood and adolescence (Assini-Meytin & Green, 2015; Boden et al., 2008; Hobcraft & Kiernan, 2001), which leads to the conclusion that earlier onset of parenthood itself does not substantially increase the level of disadvantage beyond what already exists (Lee & Gramotnev, 2006; Zeck et al., 2007). In contrast, the advantageous outcomes experienced by older parents are associated with educational attainment and economic opportunities to develop careers and accumulate wealth, rather than the delay itself (Hofferth, 1984; Nisén et al., 2019). Based on the findings in empirical literature, it can be surmised that an array of life course factors are associated with differential outcomes observed among younger and older parents.

With an increase in research examining outcomes for those aged in their mid to late 30s and beyond, there is a growing body of robust literature to suggest that early onset of parenthood may not be as detrimental as previously thought (Geronimus & Korenman, 1992). However, these studies are often limited to single sex cohorts, cross-sectional research or longitudinal studies of age-specific cohorts. As a result, some areas in the literature will benefit from the research conducted for this dissertation. These will include understanding differences in outcomes among those with an early and delayed onset of parenthood by accounting for potential explanatory factors spanning from birth through to mid-adulthood, which can only be achieved with data collected from a birth cohort such as the CHDS. Furthermore, as the majority of the research is conducted on mothers, this research will also contribute to the gaps in literature regarding gender differences in outcomes among parents.

A significant critique of the existing body of literature on parenthood is that it has become synonymous with young mothers (Thornberry, 1997). From a historical context it

was important to focus on young mothers, as they were the primary caregivers of children, they had less access to resources and without the appropriate support were more likely to experience hardship when seeking further education or employment (Barnes, 2015; Gibb et al., 2014). A consequence of primarily focusing on mothers is the lack of literature dedicated to understanding the transition to fatherhood and outcomes for fathers. Based on the previously mentioned literature, with the exception of a few studies, the factors predicting an earlier onset of parenthood are relatively similar for males and females. Likewise, the factors predictive of delayed parenthood were similar across gender, but the role of education and employment is thought to have a greater impact on mothers than fathers – an association that is yet to be explored further in the literature. When examining outcomes, there are few longitudinal studies that compare younger and older parents on outcomes by gender. Thus, it is difficult to ascertain whether the disadvantageous outcomes experienced by younger mothers is equally shared by young fathers, or whether young mothers are more disadvantaged than fathers. This is an area in the literature that requires further exploration.

3.4 Māori and Parenthood; Onset and Life Course Outcomes

When comparing onset rates of parenthood by ethnicity, various studies have shown that in many western countries, indigenous and minority populations tend to have higher rates of teenage pregnancy and younger parents than non-indigenous populations (Cribb, 2009; Families Commission, 2008; Statistics New Zealand, 2019b). There is value, therefore, in conducting research that seeks to explain ethnic differences in the onset of parenthood; and yet, research examining ethnic differences in parenthood and subsequent life course outcomes is less common. The current research intends to address this by using data from a cohort based in New Zealand, to focus on ethnic differences between Māori and non-Māori. Importantly, Māori are the indigenous people of Aotearoa New Zealand and are known as tangata whenua (people of the land). Māori have different cultural views and customs

towards parenthood and measures of successful outcomes during adulthood (Nash, 2001; Pihama, 2011; Robson & Reid, 2001). To understand the importance of conducting research on Māori appropriately, the review section here will be structured as follows: (a) a comparison of the onset of Māori and non-Māori parenthood in New Zealand; (b) research on Māori onset of parenthood; (c) research on life course outcomes for Māori parents; (d) Māori methodological approaches to research; (e) a critique of existing research on Māori parents.

3.4.1 The Onset of Parenthood for Māori and Non-Māori parents in New Zealand

Both Cribb (2009) and the Families Commission (2008) observed intergenerational changes in the onset of parenthood and fertility rates across three generations of New Zealand mothers of a range of ethnicities (see section 1.1.1 for details). When comparing Māori and European mothers, rates of delayed parenthood and declining rates of fertility in mothers was examined by ethnicity, and it was evident that both Māori and Europeans were following the same intergenerational trend. However, an ethnic difference emerged between Māori and New Zealand European mothers (non-Māori). Across the three generations, New Zealand European mothers' median age increased from approximately 25 years to 28 years, with a decline in fertility rates from 4.1 to 1.9. In contrast, over the same period, the median age of Māori mothers increased from 22 years to 26 years of age, with a decline in fertility rates from 5.5 to 2.7. Despite following the same intergenerational trend of delaying parenthood, it was evident that Māori mothers were consistently younger and had larger families than their New Zealand European counterparts. These differences continued to be observed in recent government statistics reporting the median age of mothers at time of birth by ethnicity between 1998 and 2018 (Statistics New Zealand, 2019b). Over this period the median age of mothers increased from 29.3 to 30.5 years. For New Zealand European mothers, the median age was older than average, increasing from 30 to 30.8 years, whereas the median age of Māori mothers increased from 25.6 to 27 years, being younger than both the national median

age and New Zealand European mothers. These ethnic differences between the indigenous population and New Zealand Europeans is not unique to Aotearoa New Zealand. Similar findings are also observed among Inuit in Canada (Archibald, 2004), Native Americans (Sandefur & Liebler, 1997) and Indigenous Australians (Van der Klis et al., 2002), where indigenous populations had higher rates of younger parents.

In addition to Māori having higher rates of young parents, as a population they are also disproportionally disadvantaged across a range of social and economic indicators when compared with Europeans (Cormack et al., 2020; Marriott & Sim, 2015; Ministry of Health, 2018; Robson & Reid, 2001). There is an existing body of literature indicating that socio-economic disadvantage, educational underachievement, and family adversity increase the likelihood of young parents regardless of ethnicity (Furstenberg Jr, 2003; Luker, 1997; Mantell, Craig, Stewart, Ekeroma, & Mitchell, 2004; Nash, 2001; Pihama, 2011); therefore careful consideration needs to be given when using ethnicity or culture as factors associated with parenthood or subsequent outcomes, because these are different measurement constructs whose differences are discussed further below (see section 2.4.6).

3.4.2 Research on Māori Onset of Parenthood

Within quantitative literature, Māori ethnicity has been the primary measure used when researching Māori parents. This is often because ethnicity measures provide the opportunity to compare groups (e.g. Māori versus non-Māori). Previous research, using measures of ethnicity, have identified differences in outcomes. Five publications have commonly identified that participants who reported a sole Māori ethnicity reported differential outcomes from those who identified as mixed ethnicity, only of Māori descent or not Māori at all (Dickson et al., 2000; Didham & Boddington, 2011; Marie et al., 2011; Rerere, 2018; Woodward et al., 2001). Based on the differences observed within these five publications, the authors inferred that Māori culture may be a contributing factor. However,

none of the studies included measures of culture or accounted for historical impacts or the wider social context their participants lived in. The relevance of why Māori ethnicity, culture and identity need to be analysed separately in research is discussed below (see section 2.4.6).

When examining the qualitative literature, there is no research identifying how Māori ethnicity, culture or identity contribute to the timing of parenthood, although there is speculation that Māori culture may be more accepting of earlier parenthood (Pihama, 2011; Rawiri, 2007), which requires further research.

Based on existing literature, it is evident that there are differences in the onset of parenthood between Māori and non-Māori, but whether this is due to cultural values, identity or additional factors is yet to be established.

3.4.3 Research on Life Course Outcomes for Māori Parents

To date, there is no quantitative research examining the ethnic-specific differences between Māori and non-Māori in the life course outcomes associated with parenthood; however, there is a growing body of qualitative research exploring this topic. Across multiple qualitative studies it has been recognised that social support and acceptance of young parents are primary factors that reduce the adverse outcomes experienced by young Māori parents (Mantell et al., 2004; Morehu, 2005; Pihama, 2011; Rawiri, 2007). It is recognised that Māori culture emphasises the importance of particular values including: manaakitanga (reciprocity, care and nurturing), whanaungatanga (relationship, sense of family connection), and kotahitanga (togetherness) embedded within extended kinship groups (whānau). Māori emphasise the importance of these values and structures for supporting the well-being of both the mother and the children (Glover et al., 2008; Morehu, 2005). For example, social support provides young parents with respite, companionship, sense of community, opportunities to attain qualifications as well as to seek and maintain employment, which all collectively contribute to positive outcomes for parents and their offspring. Research has also indicated

that support does not have to be solely kinship based, but can include industry professionals (e.g. midwives and teachers) and friends (Mantell et al., 2004; Pihama, 2011; Rawiri, 2007). These have been termed kaupapa whānau within the literature (Cunningham et al 2005; Pihama, 2011). Thus, there is clear qualitative evidence to indicate that social support is important to improving outcomes among young Māori parents. This evidence is supported by research on non-Māori specific samples which indicate that social support improves educational, employment and mental health outcomes of young parents regardless of ethnicity (see section 2.2).

In summary, apart from research identifying the significance of social support for young parents, there is no literature examining ethnic differences between Māori and non-Māori for other outcomes associated with the onset of parenthood. Therefore, little is known about the outcomes of Māori parents compared with non-Māori parents. Considering that Māori are disproportionately disadvantaged across many social measures (Cormack et al., 2020; Cotterell & Crothers, 2011; Marriott & Sim, 2015; Ministry of Health, 2018; Robson & Reid, 2001), there is an opportunity to explore whether Māori parents experience greater disadvantage and, if so, to identify explanatory factors for any differences.

3.4.4 Māori Methodological Approaches to Research

Research 'by Māori for Māori' is often considered an appropriate approach when researching Māori. As Forster (2003) highlights, the notion of research "by Māori" suggests that the researcher is more likely to be suited with skills and knowledge to conduct research with Māori and interpret results from a cultural context. Likewise, the notion of research "for Māori" suggests applied research that is typically focused on addressing or remedying social issues that will benefit the community who are participating in the research. As Forster (2003) notes, this approach of "by Māori for Māori", reflects a dissatisfaction from Māori

being participants in research that merely describes a problem rather than attempting to address it.

There are multiple Māori methodological approaches that can be used to conduct research that benefit Māori; these include: using a kaupapa Māori approach; a Māori centred approach; as well as applying a Māori perspective. Each of these and their applicability to the research conducted in this dissertation will be briefly outlined below.

Kaupapa Māori research is conducted by Māori for Māori (Adcock et al., 2016; Cunningham et al., 2005; Strickett & Moewaka-Barnes, 2012). It is usually based on qualitative methodology that considers the broader social and cultural context of research subjects, while being explicit about the values motivating and guiding the research (Cunningham et al., 2005; Smith, 1999). Generally speaking, this is unlike most quantitative methodological approaches, which are less likely to make the motivating values of the research explicit, nor to take into account the comprehensive explanatory socio-cultural context in which the quantitative data may be situated. Kaupapa Māori research is centred on the well-being of the collective, and research is designed to be responsive to Māori in the community and seek positive outcomes (Smith, 1999). An advantage of kaupapa Māori research is that it captures the lived experience of whānau and does not reduce culture to being identified as a risk factor for an outcome. Furthermore, kaupapa Māori research has the additional advantage of understanding young parenthood from a Māori perspective (Morehu, 2005; Strickett & Moewaka-Barnes, 2012). Finally, kaupapa Māori research highlights the need for research to consider the wider social and cultural contexts in which participants are living, and how these may affect participants and their pathways in life. When considering this dissertation, however, an authentic kaupapa Māori approach cannot be applied because the data collected by the CHDS was not designed to be responsive to specific needs as identified by a Māori community.

Similarly, a Māori centred research approach, has Māori researchers involved in all its levels, including design, data collection and data analysis (Cunningham, 1998). However, a Māori centred approach uses both Māori and non-Māori methodologies (Cunningham, 1998). The intention is for each aspect of the research methods and practices employed in research to be cognizant of Māori culture, Māori knowledge and the contemporary realities of Māori people (Durie, 1995, 1998; Forster, 2003). Thus, Māori centred research seeks to incorporate Māori aspirations, build capacity, and promote appropriate methodologies to address issues of interest in Māori communities (Forster, 2003). When considering this dissertation, a true Māori centred approach cannot be applied, because the inclusion of Māori culture and knowledge was limited to the Māori cultural affiliation questionnaire within the CHDS. However, it should be noted that later CHDS questionnaires relating to Māori were developed through a partnership between the CHDS and Ngāi Tahu Research Centre (NTRC – a research arm of Te Rūnanga o Ngāi Tahu) and through kaumātua leadership and oversight of the process.

When considering the Māori specific content of this dissertation, it is clear that neither an authentic kaupapa Māori or Māori centred approach can be utilised. However, a Māori cultural perspective can and will be applied when conducting data analyses and interpreting any relevant results. This will reflect a braided rivers model approach, which recognises the distinct and independent nature of western science and mātauranga Māori (Māori knowledge; Macfarlane, 2015), yet also acknowledges how the two knowledge streams can creatively and innovatively inform each other and blend. By incorporating a Māori perspective when conducting the research for this dissertation, it will ensure the findings are reflective of a Māori view. This approach will be achieved by blending my knowledge as a Māori when analysing and interpreting results from a statistical methodological approach. This blended

approach will focus on understanding difference life course pathways rather than contrasting to identify which pathway is better.

3.4.5 Critiques of Existing Research on Māori Parents

Regardless of its methodology, all research is subjected to critique, and research on Māori parenthood is no exception. Despite the limited research conducted on Māori parenthood onset and life course outcomes, there are three main critiques of the research which are reviewed below. These include differential cultural perspectives of parenthood, definitions of success, and ethnicity and culture used as measures of risk factors. It should be noted that these critiques highlight the need for future research on Māori to be conducted in a culturally appropriate manner that reflects the lived realities of Māori participants.

Firstly, the majority of the literature examining ethnic differences in parenthood or outcomes reflects a western egocentric perspective that is not representative of broader human species (Didham & Boddington, 2011; Pihama, 2011). When conducting research on Māori cohorts applying a western egocentric perspective, it is assumed that Māori and non-Māori have homogenous views of parenthood. However, there is evidence to suggest this is not the case. Literature often depicts a negative portrayal of early parenthood (Collins, 2010; Strickett & Moewaka-Barnes, 2012; Wilson & Huntington, 2006). However, there is evidence to suggest that collectivist cultures like Māori culture traditionally had a positive perspective of parenthood, irrespective of timing.

Within Te Ao Māori (the Māori world) cultural importance is placed on people. The importance of people extends to children, as they are the next generation. As a result, there is an acceptance of parenthood and childbearing regardless of age because children ensure the continuation of the whakapapa (lineage) for the whānau, hapū (sub-tribe) and iwi (tribe; Pihama, 2011). Furthermore, bearing children was not historically seen as a burden because Māori traditionally lived within tribal kinship units that emphasised the importance of both

whānau and manaakitanga. Within the traditional tribal settings, whānau, hapū and iwi had a collective responsibility in raising tamariki (children; Glover et al., 2008; Morehu, 2005). The kinship units provided support for both the parents and children, which ensured collective well-being (Glover et al., 2008; Morehu, 2005). These cultural practices of shared responsibility and continuation are not unique to Māori. They are often identified in other indigenous cultures that also have higher rates of young parents (Archibald, 2004; Eni & Phillips-Beck, 2013). However, it should not be assumed that traditional cultural practices and views are dominant among indigenous populations. As Rawiri (2007) suggested, the process of colonisation, internal migration and assimilation of Māori in New Zealand has resulted in a decline in traditional kinship support among Māori whānau and an uptake of western perceptions of parenthood being burdensome, indicating that traditional Māori cultural values may not align with all modern-day Māori – a topic that requires more research. Thus, it cannot be assumed that perceptions of parenthood are homogenous for Māori and non-Māori, nor can it be assumed to be homogenous among Māori.

Existing research is often egocentric and commonly endorses a negative perception of young parents being problematic, without considering alternative perspectives of parenthood. Nash (2001) has challenged researchers to be more critical of who gets to define young parents as being an issue or a problem, especially when indigenous cultural perspectives are not taken into consideration. This challenge is further emphasised by Pihama (2011) who argues that contemporary researchers have an opportunity to view young parents positively by de-problematising and re-contextualising teenage pregnancy and parenthood for the benefit of both the parents and their children. Therefore, when conducting research on indigenous populations such as Māori, it is important to consider different cultural views of parenthood and outcomes to ensure research is culturally appropriate.

Additionally, existing research that is relevant to this dissertation can and has been critiqued for using western measures of success with which to compare Māori and non-Māori. The common social indicators of success and well-being include: education, employment, justice and health, across all of which Māori are disproportionally disadvantaged (Cormack et al., 2020; Cotterell & Crothers, 2011; Marriott & Sim, 2015; Ministry of Health, 2018; Robson & Reid, 2001). Pihama (2011) and Robson and Reid (2001) have argued that by only using European measures, research has facilitated the perception that Māori are unable to achieve the European gold standards, without considering alternative cultural values of success. For example, within Te Ao Māori there is an emphasis on culture, whakawhanaunga (relationships), mana (prestige or status) and manaakitanga. Therefore, it could be argued that success within Te Ao Māori would include knowledge of whakapapa, fluency in speaking Te Reo Māori, connection with whānau, hapū, iwi, whenua (land) and marae (Henare, 1988; McRae & Nikora, 2006; Pihama, 2011). Therefore, when researching outcomes for Māori, it is important to also consider differences in cultural, class or personal values regarding education, employment and whānau.

Finally, a criticism of research on Māori parents is that it reduces Māori ethnicity and culture to "one catalogue of problematic aspects of early childhood, along with conduct disorder and low educational achievement" (Breheny & Stephens, 2010, p. 13). By reducing ethnicity and culture to be a causal explanation or a risk factor, especially in relation to adverse outcomes, researchers have failed to account for other explanations for any ethnic or cultural differences that could include wider social structural issues, systemic racism, cultural perspectives or the impact of historical events (Nash, 2001; Pihama, 2011; Robson & Reid, 2001). Thus Pihama (2011) has criticised authors for normalising a negative perception of Māori ethnicity and culture within parenthood research. This highlights the need for researchers to be aware of the potential interpretation of their results, how the results are

presented and how these could be perceived among the wider community. The relevance of separating Māori ethnicity, culture and identity is described below.

3.4.6 Māori Ethnicity, Culture, and Identity as Measures

The term Māori refers to a wide range of people with varying ethnic compositions and levels of engagement in Māori culture (Greaves et al., 2015). An outline of the differences between Māori ethnicity and culture will be detailed below, along with a description of why it is important to understand these differences and appreciate that measures of Māori ethnicity are not a suitable proxy for measures of Māori culture (Durie, 2001; Walker & Amoamo, 1987).

Within New Zealand, official measures of Māori ethnicity have varied across time. Throughout the census years, the definition of Māori changed from portion of descent (e.g. Māori, Māori-European, living as Māori) to quantum of blood (e.g. person of half or more Māori blood) and then to the ethnic and descent approach used today (see Robson and Reid, 2001, for discussion). Currently, the New Zealand Census records Maori ethnicity in two ways by asking: "Which ethnic group do you belong to? (Mark the space or spaces which apply to you)" and "Are you descended from a Māori? (That is, did you have a Māori birth parent, grandparent or great-grandparent, etc?)" (Statistics New Zealand, 2018). Houkamau and Sibley (2018) refer to the current census approach as "a binary measure of the ethnic groups to which people feel they belong" (p. 473), which have both advantages and disadvantages. An advantage of the current binary approach is that it allows for between-group comparisons (e.g. Māori versus non-Māori); whereas a disadvantage of this binary approach is that it doesn't allow for in-depth analysis of the Māori population in relation to culture and identity (Houkamau & Sibley, 2018). The binary approach measuring both self-identified ethnicity and Māori descent is currently the frequently used approach for

measuring ethnicity in research. This should be considered separate to measures of Māori identity described further below.

It is evident that the current standard of measuring Māori ethnicity and descent is in no way a direct reflection of Māori culture or one's engagement with Māori culture. That is, ethnicity cannot be a valid measure of cultural values, perceptions, or level of cultural engagement. For example, reporting ethnicity as solely Māori or as both Māori and European does reflect differential levels of mātauranga Māori (Māori knowledge), knowledge of whakapapa, ability to speak Te Reo Māori, or understanding of tribal tikanga (customs) or kawa (protocols). Thus, research that reduces ethnicity to a causal explanation reflecting Māori culture should be considered invalid. This is because ethnicity does not reflect culture, nor does it consider wider historical events contributing to intergenerational trauma, let alone the impact of social or institutionalised racism on differential outcomes and views within society.

Alternatively, measures of Māori identity have been developed to account for engagement with aspects of culture in relation to Māori identity. However, it should be noted that Māori identity is not a static concept. Instead, it is fluid and varies throughout the life course. As emphasised by Durie (1995, p. 465) "throughout the human life-cycle, situations, attitudes, values and aspirations change so that Māori individuals at different stages in life may demonstrate quite different characteristics from those present at other stages". Furthermore, it has been recognised that one's expression of a Māori identity may change depending on in-group/out-group dynamics, cultural knowledge, and situational context (Reid & Rout, n.d.). Due to the fluidity of Māori identity and the diverse aspects of Māori culture, very few measures have been developed to assess Māori identity. These include the 40-item "test of Māori knowledge" (Thomas, 1988) and Te Hou Nuku Roa (Durie, 1995); and the revised multidimensional model of Māori identity and cultural

engagement (MMM-ICE2; Houkamau & Sibley, 2015), each of which includes aspects that recognise both Māori ethnicity and aspects of Māori culture and knowledge.

Therefore, when conducting research on indigenous groups such as Māori, authors should be aware of the differences between ethnic, culture and identity measures, their inherent limitations, and how these can affect their research questions and interpretation of results.

An advantage of the CHDS is the collection of both ethnicity and culture measures collected by the CHDS at various ages. The cultural measures were originally developed in collaboration with the Ngāi Tahu Māori Health Research Unit (NTMHRU; Broughton et al., 2000) and will be used within this dissertation. This will provide an opportunity to explore the role of both ethnicity and culture in the onset of parenthood and subsequent life course outcomes.

In summary, Māori have differential rates of parenthood, but research conducted in this realm do not reflect Māori cultural perspectives of childbearing as being a positive life event. Research often assumes ethnicity is reflective of culture and compares Māori on western measures of success without considering Māori cultural values of success. This future research needs to consider such critiques when examining future research on Māori.

3.5 Literature Review Approach

The literature included in this dissertation were selected based on its relevance to the research questions outlined within this dissertation. This included chapters, journal articles, dissertations, reports both officially published and unpublished (if access was obtained). The primary search engines included google scholar and the University of Canterbury Library and the University of Otago Library. No specific journal database was targeted to be searched thoroughly however, when obtaining a paper from a journal database, brief searches of similar papers were conducted within each journal database. Similarly, bibliographies of

published papers were also scanned to identify other possible papers that may be relevant to this dissertation.

When searching for literature, search terms such as parenthood, onset of parenthood, young parents/mothers/fathers, teenage parents/mothers/fathers, early parents/mothers/fathers, delay parents/mothers/fathers, geriatric parents/mothers/fathers, unplanned parenthood/motherhood/fatherhood were the primary focus. When additional terms were identified in the literature that may have been relevant, additional searches were conducted using the newly identified terms.

The intention is to identify literature both quantitative and qualitative that provide information regarding the onset of parenthood and life course outcomes anywhere within the world. Literature was only excluded if it was not relevant to the research questions, was not written in English or could not be accessed online or via the University libraries. The search was initially conducted in 2017 to 2018, over the successive years, additional searches were conducted to identify any additional new relevant research.

3.6 Limitations of the empirical literature

A range of methodological approaches have been used throughout the empirical literature examining the onset of parenthood and subsequent outcomes. These have included cross-sectional research using census data, qualitative methodology including using a kaupapa Māori approach, historical event analysis, and longitudinal studies including birth cohorts and age-specific cohorts.

Despite some consistent findings, there are general methodological limitations in the span parenthood research to date which make it difficult to arrive at firm conclusions regarding how factors influence the onset of parenthood and the subsequent life outcomes. There were five main limitations of existing research. Firstly, the use of cross-sectional or retrospective study designs. Cross-sectional designs cannot account for temporal relationships

between explanatory and outcomes variables because they are measured simultaneously (McLanahan & Bumpass, 1988; Wellings et al., 1999). Likewise, retrospective studies are limited by the measures assessed, which have the potential for biases and inaccuracy on memory recall (Buvinic, 1998; Ravanera & Fernando, 2004). Secondly, there is often a lack of prospective measurements of childhood and adolescent factors, the lack of prospective measures makes it difficult for researchers to control for a temporal relationship between early life course factors and outcome measures (Lee & Gramotnev, 2006; Van der Klis et al., 2002). Thirdly, the use of selected samples or specialised populations can make it difficult to generalise findings to the population (Assini-Meytin & Green, 2015; Nisen et al., 2019; Van der Klis et al., 2002). Fourth, is the lack of control for earlier life factors in estimating the association between the transition to parenthood and outcomes later in life. Then finally, too-short follow-up periods that do not allow for assessing a range of ages at which individuals transition to parenthood (Fergusson & Woodward, 2000; Moffitt, 2002; Zeck et al., 2007). The best research design to examine the onset of parenthood and subsequent outcomes is a longitudinal design with prospectively assessed measures of parenthood that may also be related to subsequent outcomes.

Within parenthood research there have only been three longitudinal designs which have published findings relevant to this dissertation. Firstly, the National Child Development Study (NCDS; Dearden et al., 1994; Hobcraft & Kiernan, 2001; Manlove, 1997) which is a multidisciplinary longitudinal study following 17,415 people born in England, Scotland and Wales in 1958. Secondly is the Environmental Risk (E-Risk) Longitudinal Twin Study (Moffitt, 2002), which comprises a birth cohort of 2,232 same-sex twins born in England and Wales in 1994–1995. Publications from the NCDS and E-Risk study were consistent with other literature, identifying that earlier onset of parenthood was associated with disadvantage (Dearden et al., 1994; Manlove, 1997). However, these longitudinal studies also have their

limitations, as they only reported single sex and thus were unable to examine gender differences. Finally, Nisen et al. (2019) utilised longitudinal models and Finnish data to examine the gendered impacts of delayed parenthood on educational and labour market outcomes. This research collected follow-up measures from age 16 to 32 years, to explore gender differences in delayed parenthood on education and labour markets. An advantage of this study is that it is the only study to have used time-dynamic measures to explore how differences throughout the life course affect outcomes by age 32. This novel approach of including time-dynamic variables will also be applied in the current research.

This dissertation will address three of the general limitations mentioned above and extend on previous longitudinal research. Firstly, the current research will be reporting findings a from a 40-year longitudinal study of a New Zealand birth cohort. Secondly, the CHDS has prospectively measured factors associated with the onset of parenthood and subsequent life outcome. Thirdly, the longitudinal nature of the study of a birth cohort, allows for the control of earlier life factors in estimating the associations between the transition to parenthood and outcomes measures. Then finally, unlike previous literature, the CHDS has collected data over 40-years allowing for a greater time span to collect information on parents and assess outcomes.

3.7 Purpose of This Research

Within parenthood research there are relatively consistent findings throughout the literature. These can be broadly summarised as: (a) early onset of parenthood is associated with adverse childhood and adolescent experiences; (b) delayed onset of parenthood is associated with advantageous pathways during adulthood; (c) the factors predicting the onset of parenthood for men and women are relatively similar, but little is known about Māori and non-Māori nor the role of culture therefore further research is required; (d) earlier onset of parenthood is associated with disadvantageous outcomes; (e) further research is required to

identify any differences in outcomes between mothers and fathers as well as Māori and non-Māori parents. The purpose of this dissertation is to extend existing research and provide new knowledge to the literature. This will be done by using data from the CHDS to examine these aspects (a– e) within two studies as described briefly below.

There are five aims for Study 1, which will focus on documenting the onset of parenthood in the cohort up to age 40 and identify factors predictive of an early versus a delayed onset of parenthood. These are (a) Examine differences in the onset age of parenthood by gender as well as between Māori and non-Māori; (b) Identify what factors are predictive of the onset age of parenthood; (c) Identify the extent to which factors explain gender and Māori ethnic identity differences in the onset age of parenthood (main effects); (d) Identify the extent to which the strength of factors that are predictive of the onset age of parenthood are different between males and females as well as Māori and non-Māori (interactions); (e) Explore within the Māori cohort the role of cultural affiliation as a factor that is predictive of the onset age of parenthood. Based on existing literature, it is hypothesised that females and Māori will have a more rapid onset of parenthood earlier in life than males and non-Māori. Furthermore, it is hypothesised that earlier onset of parenthood will be associated with adverse life events during childhood and adolescence. These factors will include being raised in an adverse economic situation as a child, inconsistent parental role models, lack of educational attainment, as well as deviant and precocious behaviour during adolescence. In contrast it is hypothesised that delayed onset of parenthood will be associated with later life events related to educational attainment, relationship stability and economic security. The gender and ethnic specific hypothesises are discussed further below.

The aims of Study 2 are to examine whether the associations between the onset of parenthood and life course outcomes at age 40. This is in order to investigate the extent to which differences in outcomes between those with an early versus a delayed onset of

parenting are explained by prior childhood and adolescent characteristics or by mediating processes associated with an earlier onset of parenthood. The five aims for Study 2 are: (a) To investigate the associations between the onset of parenthood and adult functional outcomes; (b) To examine the extent of differences in these associations by gender and between Māori and non-Māori; (c) To examine the extent to which these associations are explained by prior childhood/adolescent characteristics known to be associated with early transition to parenthood; (d) To explore potential mediating pathways that may explain any residual associations between the transition to parenthood and later outcomes after adjustment for prior childhood and adolescent factors; (e) To explore the role of cultural affiliation within the Māori cohort, as both an explanatory factor and an outcome. Based on previous literature, it is hypothesised that those who transition into parenthood earlier in life will experience more disadvantaged outcomes than those who delayed the onset of parenthood. These will include lower rates of home ownership, lower family income, less education, less psychological well-being, and greater mental health problems. However, in line with previous literature, it is hypothesised that any differences observed between younger and older parents will not be attributed to the onset of parenthood itself but rather to a range of factors including childhood adversity, economic situation, employment, and forms of social support, all of which are associated with earlier parenthood. The gender and ethnic specific hypothesises are discussed below.

A particular focus of both studies will be to examine the extent to which there are gender and ethnic differences between Māori and non-Māori, both in the onset of parenthood, and in the associations between the onset of parenthood and subsequent outcomes; and within the Māori cohort, to explore the role of cultural affiliation as a further explanatory factor.

Regarding gender, based on previous literature it is hypothesised that a higher proportion of women will transition into earlier parenthood than men. However, it is expected

that the factors associated with the onset of parenthood will be relatively consistent for both men and women. It is also hypothesised that gender differences will be observed in life-course outcomes. These will include less education in younger mothers than in young fathers, and greater employment in fathers. Furthermore, the relative disadvantage in outcomes for early and later parenthood will be similar for males and females.

Regarding Māori, based on previous literature it is hypothesised that a higher proportion of Māori will transition into earlier parenthood than non-Māori. Furthermore, its hypothesised the relative disadvantage in outcomes for early and later parenthood will be similar for Māori and non-Māori. However, it is expected that factors associated with the onset of parenthood will be relatively consistent for Māori and non-Māori. Due to limited research in the literature, it is difficult to form a hypothesis as to whether any ethnic differences will be observed across life-course outcomes in adulthood. However, since Māori generally experience greater disadvantages than non-Māori in New Zealand, it is hypothesised that Māori parents are likely to experience more adverse outcomes than non-Māori parents. As the role of cultural affiliation and parenthood has never been explored in quantitative research, there is no hypothesis as to how cultural affiliation will predict the onset of parenthood or life course outcomes. As previously mentioned, to ensure the Māori content of this research is not subjected to the same criticisms as pre-existing research, this dissertation will apply a Māori perspective that is reflective of the braided rivers model (Macfarlane, 2015). Thus, a Māori perspective will be applied when conducting analyses and producing culturally appropriate publications when possible. The specific aims and methods of each study will be discussed in the relevant chapters.

Chapter 3: General Methods

To reduce repetition within this dissertation, the general methods and variables that are relevant to both studies are described in this chapter. The methodological information that is specific to a study is contained within the method section of the relevant chapter.

4.1 Data Source

The participants for this study are members of the Christchurch Health and Development Study (CHDS). The CHDS is a prospective longitudinal study of a birth cohort of 1265 children studied until the age of 40. The CHDS recruited the sample over a four-month period during 1977 by contacting all mothers who had given birth in public and private maternity hospitals to live-born children within the urban region of Christchurch, New Zealand. Of the 1,310 children born during this period, the mothers of 1,265 (97%) agreed to participate in the study.

The participants and their families have been assessed at birth, at four months, and annually from age 1 to 16 years, at 18 and 21 years and then at five-year intervals from 25 to 40 years old. The CHDS has collected a wide range of data on the health, development and adjustment of the cohort throughout this period. All phases of the CHDS have been approved by the Regional Health and Disability Ethics committee. All aspects of the data collection have been subject to the signed consent of the participants.

4.2 Procedure

The CHDS has collected data from several sources based on a multiple informant model. Below are the main sources for data used within this dissertation. The specific measures collected through each source will be described in detail in the relevant method sections.

Parental interviews (birth–16 years). These were conducted with the child's mother, or in situations of single-parent families with a male parent, with the child's father, within the

child's home. The durations of the interviews were generally one to two hours and were administered by trained interviewers. Interview topics spanned a variety of issues relevant to the child's health and family functioning. In the parent interviews, the parental report data was the primary source of information on measures of family, social and economic background, child behaviour and childhood family functioning.

Participant interviews (age 8–40 years). Beginning at age 8 and continuing up to age 16, participants were questioned about a range of issues relevant to their stage of development. During this period, the interviews were typically brief, ranging from 20 minutes to an hour in duration. From age 18 onwards the participants became the primary informant. The duration of the interviews increased as the participants grew older, varying from one to four hours. These interviews will be the primary source of information regarding the timing of parenthood, outcomes, and explanatory factors.

Psychometric testing (age 8–13 years). The participants were administered a range of individual tests of achievement by trained psychometric testers. These tests of cognitive ability are used in the current research.

Teacher reports (age 6–13 years). The teachers of the CHDS children were supplied with a set of standardised questionnaires to report on child social adjustment and academic achievement. Compliance was high, with completed questionnaires available for 98% of children in any given year.

Official records (birth–40 years). The above data was supplemented by information obtained from official records including GP and hospital notes, police records and information from the school dental services.

4.3 Measures

4.3.1 Parenthood

Participants were interviewed at ages 15, 16, 18, 21, 25, 30, 35 and 40 years about pregnancies occurring since the previous assessment. The definition of parenthood changes between Study 1 and Study 2. In Study 1, parenthood is based on the age in which an individual became a biological parent regardless of whether they choose to stay involved with their child or not. This definition was chosen to reflect pathways that lead to becoming a biological parent rather than an actively involved parent. In contrast, Study 2 focuses on outcomes for parents who were involved in parenting. Therefore, the definition was adjusted to identify the age in which parents had a child and they were actively involved with the child either full-time or part-time at the time of its birth. Each studies method section has further details regarding the classification of parenthood in that study.

4.3.2 Sex at Birth

The sex of the CHDS cohort members were coded at birth. For the cohort members followed up to the age of 40, 47.68% identified as male whereas 52.32% identified as female. For the percentage of parents by sex in each study, please refer to the relevant method sections.

4.3.3 Māori by Descent

The participants were interviewed about their ethnic identity at ages 14, 21, and 25 years. At age 14, each cohort member's ethnicity was identified by their parents based on their response to the question "Which of these categories best describes your child's cultural identification?" The parents were able to answer as Māori, part Māori or another ethnicity.

Based on questions from the 1996 New Zealand Census, at ages 21, and 25, the cohort members' ethnic identities were self-identified and based on their responses to the question, "Which of the following ethnic groups do you belong to or identify with?" In addition to this,

at ages 21 and 25 years, the participants also identified whether they were of Māori descent based on their response to the question "Are you of Māori descent (that is do you have a parent, grandparent, great-grandparent, etc, who is of Māori ancestry)?". For the purposes of this study, the participants have been classified into Māori and non-Māori. Due to the variability in reporting of ethnicity and Māori descent over time, cohort members have been classified as Māori if they reported any Māori ethnicity or Māori descent at ages 14, 21, or 25 years. The remaining cohort members have been classified as non-Māori. By this classification of ethnic identity, 16.84% of the sample were identified as being of Māori ethnicity or descent, and 83.16% of the sample were identified as belonging to an ethnic group other than Māori (non-Māori). While there were participants of other minority ethnicities in the sample, their numbers were too small to allow comparative analysis and were included in the non-Māori sample. For the purposes of this research, the terminology used to compare Māori and non-Māori will be Māori ethnic identity. Likewise, any mention of ethnic differences within the studies will refer to differences between Māori and non-Māori.

4.4 Childhood and Adolescent Variables Prior to the Onset of Parenthood

A series of factors relating to socio-demographic background, family structure, family functioning, child behaviour, school achievement and adolescent functioning were identified for inclusion in the analyses for the study in Chapter 4 as well as in the study in Chapter 5. Each of these factors have been identified based on existing research linking each factor to the onset of parenthood or as a covariate for outcomes later in life. The factors relating to socio-demographic background, family structure, school achievement and deviant or antisocial peers and behaviour have all been shown to be relevant in both onset of parenthood and many outcomes. However, the factors relating to family functioning, individual characteristics and mental health have been identified as being related to the onset of

parenthood, but the association is not as prominent. The details of each measure used in the analyses of both studies are described below. The descriptions of the following variables are reported directly from the CHDS and align with those used in previous publications. Any additional measures, idiosyncratic to a specific study, are described in the relevant study methods section.

4.4.1 Socio-demographic Background

Family socio-economic status (at birth): Family socio-economic status at the time of the participants' birth was assessed using the Elley and Irving (1976) scale of socio-economic status for New Zealand. This scale classifies socio-economic status into six classes on the basis of paternal occupation. For the purposes of this analysis, this scale was reverse coded and collapsed into three levels ranging from 1 = *semiskilled, unskilled, unemployed* (N = 264, 25.0%); 2 = *clerical, technical, skilled* (N = 574, 54.4%), and 3 = *professional, managerial* (N = 217, 20.6%). A detailed account of the construction and validity of this scale is given by Elley and Irving who found that the scale correlated strongly with other socio-economic scales in Australia and New Zealand ranging from 0.83–0.90.

Maternal and paternal education (at birth). Both maternal and paternal education levels were assessed separately at the participant's birth using a three-point scale: 1 = *mother* (N = 525, 49.8%) *or father* (N = 490, 47.9%) *lacked formal educational qualifications (had not graduated from high school)*; 2 = *mother* (N = 319, 30.2%) *or father* (N = 37, 33.0%) *had a secondary-level qualification (had graduated from high school)*; 3 = *mother* (N = 211, 20.0%) *or father* (N = 195, 19.1%) *had a tertiary-level qualification (had obtained a university degree or tertiary technical qualification)*.

Averaged family living standards (birth to 10 years): Each year from birth to the age of 10, a global assessment of the material living standards of the family was obtained via interviewer rating. Ratings were made on a five-point scale: 1 = *family obviously affluent and*

well-to-do; 2 = *family has a good standard of living: appears to be better than average;* 3 = *family has an average standard of living: neither very well off nor very badly off;* 4 = *family has a below-average standard of living and is obviously not very well off;* 5 = *family obviously poor or very poor*. These scores were summed together to provide a total score of the family living standards. For the purposes of this study, the ratings were reverse scored and then averaged over the 10-year study period to obtain an overall assessment of family living standards during childhood ranging from 1 to 5. For this sample, 46.39% of the participants scored "*family has an average standard of living: neither very well off nor very badly off*".

4.4.2 Family Structure

Maternal age at childbirth: At the birth of each participant, the mother's age was recorded in whole years. The mean maternal age at first childbirth for the participants was 25.9 years (SD = 4.81), with maternal ages ranging from 15 to 45 years.

Born into two-parent family: This measure was based on whether the participants entered a single-parent family or a two-parent family at birth. Two-parent family was defined as parents who were either married or cohabiting. A total of 93.6% of the participants were born into two-parent families and 6.4% of the participants were born into single-parent families.

Childhood parental change(s) (birth to 16 years): Comprehensive data on the child's family placement and changes of parents were collected at annual intervals from birth to age 16 years. To assess the extent of parental change, a measure of the child's exposure to parental change was constructed by counting the number of changes of parents up to age 16 years. Parental change was defined as a parent: leaving the home as a result of separation, divorce or death; entering the home due to reconciliation/re-partnering or fostering; or any other change in the custodial parents. The mean number of changes of parent for the participants was 1.3 (SD = 2.56), with the range being 0–27.

4.4.3 Family Functioning

Parental Intimate Partner Violence (IPV) (≤16 years): At age 18 years, separate questioning for mothers and fathers was conducted concerning IPV. The participants were questioned using eight items derived from the Conflict Tactics Scale (Straus, 1979) to assess the extent to which they had witnessed incidents of verbal aggression, physical violence or serious threats of physical violence between their parents prior to age 16 years. The eight items used included: (1) *threaten to hit or throw something*; (2) *push, grab, or shove other parent*; (3) *slap, hit or punch other parent*; (4) *throw, hit, kick or smash something (in other parent's presence)*; (5) *kick the other parent*; (6) *choke or strangle other parent*; (7) *threaten other parent with a knife, gun or other weapon*; (8) *call other parent names or criticise other parent (or put other parent down)*. The items were scored on a three-point Likert scale: 1 = *never*, 2 = *occasionally*, 3 = *frequently*. This information was used to construct two scale scores representing the extent of mother-initiated and the extent of father-initiated violence. The reliability of these scales ranged from $\alpha = 0.77$ to $\alpha = 0.86$ (Fergusson & Horwood, 1998). For the purposes of the present analysis the mother and father scales were combined to create an overall measure reflecting the extent of parental IPV initiated by either parent during childhood ($\alpha = 0.88$; Jones, 2016). The sub-score of parental IPV actions ranged from a minimum of 8 (no parental IPV) to a maximum of 24 (frequent parental IPV on all items). The data show that 55.66% of the participants reported no parental IPV. Scores ranged from 8 to 24 and the overall mean was 9.25 (SD = 2.31).

Parental history of criminal offending: At age 15 years, the participants' parents were asked whether they had a history of criminal offending. This included offending involving property, violence, drinking, drink-driving, or being convicted of a criminal offence. Based on this information, the participants were coded as: 0 = *no history of parental criminality*; or

1 = *history of criminality for at least one parent*. Only 13.3% (N=129) of the participants were classified as having a parental history of criminality.

Parental history of substance use/problems: When participants were aged 11 and 15 years, their parents were questioned about their (parents) involvement in illicit drug use and problems with alcohol. The parents were asked if the mother or father had a history of the following problems: problems with alcohol, alcoholism, drug use or drug addiction. The parents responded either 0 = *No* or 1 = *Yes.* Participants were classified as having a parental history of substance use/problems if any parent reported a history of using illicit drugs or problems with alcohol. The participants were coded as: 0 = *no history of parental illicit substance use or problems with alcohol*; or 1 = *history of illicit substance use or problems with alcohol for at least one parent*. A total of 31.1% (N = 313) of the participants were classified as having a parental history of substance use/abuse.

Quality of parental attachment: When the participants were aged 15 years, the Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987) was used to assess adolescents' perceived attachment to their parents. The IPPA consists of three sub-scales measuring parental communication (10 items), trust (10 items), and alienation (8 items). Examples of scale items include "*I tell my parents about my problems and troubles*" and "*My parents help me to understand myself better*". All items were rated on a three-point Likert scale ranging from: 1 = *doesn't apply* to 3 = *definitely applies*. The parental attachment scale used in this analysis did not differentiate between the participants maternal and paternal attachments. A total parental attachment score was computed by first reverse scoring the alienation sub-scale and then subtracting the trust and communication sub-scale scores. The Cronbach's α for the parental attachment scale was .87 (Jones, 2016). The IPPA has good test–retest reliability and predictive validity, with the perceived quality of attachment to parents being positively correlated with self-esteem, psychological well-being, family

functioning, and adolescent seeking of proximity to both mothers and fathers in times of need (Armsden & Greenberg, 1987; Jones, 2016). The mean level of quality of parental attachment for the participants was 72.9 (SD = 9.7), with the range from 32–84.

4.4.4 Childhood Abuse Exposure

Parental use of physical punishment/maltreatment: At ages 18 and 21 years, the participants reported the extent to which their parents used physical punishment during their childhood (prior to age 16) on nine items scored on a three-point Likert scale: 1 = *no,* 2 = *occasionally*, 3 = *frequently*. If applicable, separate ratings were made for mothers and fathers. These ratings were then combined into a single four-point scale of parent physical punishment/maltreatment based on the most severe rating at either the 18- or 21-year interview: (a) *parents never used physical punishment* (N = 47, 4.5%); (b) *parents seldom used physical punishment* (N = 820, 77.9%); (c) *at least one parent regularly used physical punishment* (N = 118, 11.2%); (d) *at least one parent used frequent or severe punishment or treated the participant in a harsh/abusive manner* (N = 67, 6.4%) (Fergusson, Horwood, & Woodward, 2000; Fergusson & Lynskey, 1997). For the purposes of this study, the ratings for both parents (if applicable) were combined into a single rating at each age by classifying the participants into one of the four groups based on the greater level of exposure to physical punishment reported for either parent. A total of 82.4% (N = 867) of the participants reported that their parents never or seldom used physical punishment.

Childhood sexual abuse: At ages 18 and 21 years, childhood exposure to sexual abuse was assessed. The participants were questioned about their exposure to any forms of childhood sexual abuse prior to age 16. Questions were based on 15 situations in which unwanted/inappropriate sexual contact might have occurred. They were asked if anyone had ever attempted to involve them in any of the sexual activities listed when they did not want it to happen. These activities included: (a) *non-contact episodes involving indecent exposure,*

public masturbation or unwanted sexual propositions; (b) *episodes involving sexual contact in the form of sexual fondling, genital contacts or attempts to undress the respondent*; and (c) *episodes involving attempted or completed vaginal, oral and anal intercourse*. The participants who reported an incident of abuse were then questioned in depth about the context of the abuse including the frequency of abuse episodes, the characteristics of the perpetrator(s), abuse disclosure and related factors (Fergusson, Horwood, & Lynskey, 1996; Fergusson et al., 2000; Fergusson, Lynskey, & Horwood, 1996). Using these data, participants were classified into one of four exposure groups reflecting the extent/severity of childhood sexual abuse reports: (a) *no sexual abuse* (N = 904, 85.9%); (b) *non-contact sexual abuse only* (N = 28, 2.7%); (c) *contact sexual abuse not involving attempted or completed sexual penetration* (N = 54, 5.1%); (d) *attempted or completed sexual penetration including vaginal, oral and anal intercourse* (N = 66, 6.3%). This classification was based upon the most severe form of childhood sexual abuse reported at either age 18 or 21 years.

Ascertaining reliability of abuse reports: The validity of this repeated measures assessment of reported childhood sexual abuse and parental use of physical punishment has been examined in previous papers using both a latent class analysis (Fergusson et al., 2000) and a structural equation model designed to estimate the effects of current mental state on the reporting of childhood sexual abuse and parental use of physical punishment (Fergusson, Horwood, & Boden, 2011). These analyses showed that the effects of the respondents' current mental state on their reporting of childhood sexual abuse and parental use of physical punishment were negligible, and that the retrospective reports of childhood physical and sexual abuse had good validity as a measure of childhood sexual abuse and parental use of physical punishment (Fergusson, Horwood, Miller, & Kennedy, 2011; Fergusson, Woodward, & Horwood, 2000).

4.4.5 Childhood Behaviour

Childhood conduct problems (7–13 years): At each year from age 7–13 years, parental and teacher reports of the child's tendencies to disruptive, oppositional and conduct-disordered behaviours were obtained by developing a measure that combined items from the Rutter (Rutter, Tizard, & Whitmore, 1970) and Conners (1969, 1970) parent and teacher questionnaires. The parent questionnaire contained 22 items and the teacher questionnaire 21 items. The selected items spanned a range of behaviours relating to disobedience and defiance of authority, fits of temper and irritability, aggression or cruelty towards others, destruction of property, lying, stealing and other similar behaviours, with these items being scored on a three-point scale from 1 = *not at all* to 3 = *a great deal*. Confirmatory factor analysis of the selected items for each source (parents, teachers) suggested that, in each case, the items could be scaled as unidimensional scales representing the extent of child conduct problems as reported by parents and teachers (Fergusson & Horwood, 1987). Scale scores representing the extent of disruptive, oppositional or conduct-disordered behaviour were created by summing parental and teacher item scores together at each assessment age. For the purposes of the present analysis the parent and teacher item scores were summed together at each year and then averaged over the interval of 7–13 years to create global measures of the child's tendencies to conduct problems during childhood. This procedure was used to reduce the effects of situational and rater bias. The resulting scale was of excellent reliability with Cronbach's α value of .97. The mean conduct problem score for the participants was 51.7 (SD = 8.1), with a range from 43–99.

Attentional problems (7–13 years): At each year from age 7–13 years, parental and teacher reports of the child's attentional problems were obtained using an instrument that combined items from the Rutter (Rutter et al, 1970) and Conners (1969, 1970) parent and teacher questionnaires. The parent questionnaire had eight items and the teacher

questionnaire had seven. The selected items spanned a range of behaviours relating to inattention, poor concentration, short attention span, distractibility, restlessness and hyperactivity. All items were scored on a three-point scale from 1 = *not at all* to 3 = *a great deal*. Confirmatory factor analysis of the items for each source (parents, teachers) suggested that, in each case, the items could be scaled as unidimensional scales representing the extent of child attentional problems as reported by parents and teachers (Fergusson, Horwood & Lloyd, 1991). For the purposes of the present analysis the parent and teacher item scores were summed at each year and then averaged over an interval of 7–13 years to create global measures of the child's tendency towards attentional problems during childhood. This procedure was used to reduce the effects of situational and rater bias. The resulting scale was of excellent reliability with Cronbach's α value of .93. The mean attentional problem score for the participants was 19.9 (SD = 4.74), with a range from 15–45.

4.4.6 School Achievement

Scholastic ability: The Test of Scholastic Abilities (TOSCA; Reid, Jackson, Gilmore, & Croft, 1981) was administered to the participants when the children were 13 years old. The TOSCA measures the extent to which the child exhibits the skills and competencies necessary for academic work at school. This measures the child's abilities in three content domains (numbers, letters, and sentences) and three process domains (conceptualisation, classification and operations). An account of the construction and validation of this measure had been provided by Reid et al. (1981). The TOSCA was scored in the manner prescribed by the TOSCA test manual to give a total scholastic ability score. The TOSCA has been shown to fit a single factor model (Fergusson, Horwood & Lynskey, 1992) and is of high reliability (α = .95). The mean scholastic ability scores of the participants was 34.8 (SD = 15.3), with a range from 0–69.

Scholastic performance: Grade point average (GPA) was measured at each assessment from age 11–13 years. The child's class teacher was asked to rate the child's performance in each of five areas of the curriculum (reading, handwriting, written expression, spelling and mathematics) using a 5-point scale ranging from 1 = *very good*, 2 = *good*, 3 = *average*, 4 = *poor*, 5 = *very poor*. To provide a global measure of the child's educational achievement over the interval from the age of 11–13 years, the teacher ratings were reverse scored and summed across years and curriculum areas. The scores were averaged to provide a teacher rating GPA for each child to give a scholastic performance score. The reliability of this measure was $\alpha = .96$. The mean scholastic performance score for the participants was 3.47 (SD = 0.86), with a range of 1–5.

4.4.7 Adolescent Functioning and Individual Traits

Neuroticism: Neuroticism was assessed using a short form sub-scale version of the neuroticism scale of the Eysenck Personality Inventory (Eysenck & Eysenck, 1964), which was administered when the participants were aged 14 years. The items were scored on a three-point Likert scale: 1 = *not like me*, 2 = *a bit like me*, 3 = *a lot like me*. The mean score for neuroticism for the participants was 14.22 (SD = 3.83), with a range of 10–30.

Early regular substance use: At age 15, the participants were asked how frequently they used cigarettes, alcohol and cannabis in the year prior to the age 15 assessment. For the purpose of the present analysis the responses were combined to create an overall dichotomous measure of early substance use, based on whether the participant had reported using any substance at least monthly or not. For the purposes of this study, *regular* was defined as using at least one substance at least monthly. Based on this information, participants were coded as 0 = *no early regular substance use* or 1 = *early regular substance use*. Of the sample, 33.8% (N = 323) were classified as early regular substance users.

Deviant peer affiliations (15 years): To provide a measure of the extent to which participants were involved with delinquent peers at age 15, an index of deviant peer affiliations was constructed. This index was based on six self-reported items concerning the involvement of the participant's friends in a range of behaviours including the extent to which their friends used tobacco, alcohol, or other substances, criminal offending, and related behaviours. These items were rated on a three-point Likert scale: 0 = *never*, 1 = *somewhat* and 2 = *definitely*. These items were summed to produce a scale measure of the extent to which the participants reported affiliating with delinquent or substance using peers at age 15. The construction of this scale has been described previously in more detail (Fergusson & Horwood, 1999), and was found to be moderately reliable with a Cronbach's $\alpha = .76$. The mean score for deviant peer affiliation for the participants in this sample was 4.44 (SD = 2.49), with a range of 2–12.

Early history of depression (15 years): At age 15, participants and their parents were interviewed concerning aspects of the young person's mental health over the past 12 months. As part of this interview, information was obtained on the extent to which the participant met DSM-III-R symptom criteria for major depression (based on a major depressive episode). Questioning was conducted using an abbreviated (self-report with 15 items or parent-report with 16 items) version of the Diagnostic Interview Schedule for Children (DISC; Costello et al., 1982). At the time this research was planned, the DISC version suitable for assessing DSM-III-R criteria was not available. Therefore, the DISC items were supplemented by items from the Diagnostic Interview Schedule (DIS; Robins et al., 1981) to meet the DSM-III-R depression criteria that were not covered in the original version of the instruments as described by Fergusson, Horwood & Lynskey (1993). The nine symptom criteria assessed included: depressed mood for most of the day, every day; diminished interest or pleasure in activities; irritability; significant weight change; insomnia or hypersomnia; psychomotor

agitation or retardation; feelings of worthlessness or guilt; inability to think or concentrate; and recurrent thoughts of death and suicide (see DSM-III-R, pp. 222–224 for details). To meet DSM-III-R criteria for major depression an individual must have experienced at least five of the symptoms during the same two-week period, with at least one of the symptoms being either (a) depressed mood or (b) loss of interest or pleasure. All items were assessed on a three-point Likert scale coded: 1 = *No*, 2 = *Yes, perhaps*, and 3 = *Yes, definitely*. Participants were classified as meeting criteria for symptoms if they or their parents reported *Yes, definitely*. For the purposes of this study, participants were classified as having had major depression at age 15 assessment (6% of the sample), if they met DSM-III-R symptom criteria for a major depressive episode in the previous 12 months, based on either parent or self-report. In Chapter 4, depression is also used as a time dynamic factor to model the onset of parenthood in relation to time dynamic changes in depression. This is conceptually distinct from the measure of depression described here, which is used to reflect this aspect of the individual's mental health prior to the onset of parenthood.

Early sexual intercourse: At ages 15 and 16 years, in the context of a series of questions concerning close interpersonal relations, the participants were asked whether they had engaged in sexual intercourse within the preceding 12 months. If the participants responded as being sexually active, they were asked a series of follow-up questions concerning their activity. These included being asked to provide an estimate of the age at which they first initiated consensual intercourse. A detailed description of early sexual and contraceptive behaviours in this cohort has been provided by Lynskey and Fergusson (1993). The participants in this sample were classified as engaging in early sexual intercourse (25% of the sample) if they reported having consensual sexual intercourse before the age of 16. This age was selected because the youngest parent was aged 16 years and the age of consent in New Zealand to have sex is 16.

Novelty seeking (16 years): At age 16 years the participants were given the novelty-seeking sub-scale from the Tridimensional Personality Questionnaire (TPQ; Cloninger, 1987; Cloninger, et al., 1991). The TPQ is a 100-item true/false instrument that measures three personality domains: novelty seeking, harm avoidance and reward dependence, each of which comprises four lower order dimensions. The novelty seeking scale (31 items) was used in this study and comprises four subscales: (a) exploratory excitability, (b) impulsiveness, (c) extravagance and (d) disorderliness. The participants responded to each item as a dichotomous response coded as 0 = *false* or 1 = *true.* The items are summed to produce an overall novelty seeking measure with higher scores denoting higher novelty seeking. The reliability of this scale was found to be moderately good ($\alpha = .76$) with scores on the scale ranging from 2–31 ($M = 18.3$, $SD = 5.13$).

4.5 Māori Cultural Variables

A range of Māori cultural variables were developed between the CHDS and the NTRC (Broughton et al., 2000). Any participant who identified their ethnicity as Māori or being of Māori descent during the 21-year, 25-year and 40-year interview was asked a range of questions relating to Māori culture. These questions broadly reflected the domains of knowledge, perception, engagement, and connection.

Knowledge. The participants were asked six questions relating to Māori knowledge as follows:

(a) Do you know the name of your iwi (tribe or tribes)?

(b) Do you know the name of your marae?

The participants responded to (a) and (b) as 0 = *no or* 1 = *yes*

(c) What describes your ability in speaking Te Reo Māori?

The participants responded on an 8-point scale coded as: 1 = *know no Te Reo Māori at all,* 2 = *know a few words and basic greetings but not learning anything*

new, 3 = *learner of Māori at a basic level (learning new words/expressions),* 4 = *learner of Māori at a medium level (good vocabulary, sentence construction),* 5 = *learner of Māori at an advanced level (speaks confidently in most situations,* 6 = *fluent speaker of Māori learnt as a second language,* 7 = *native speaker of Māori learnt as a first language,* 8 = *have a good understanding of Te Reo Māori but do not speak Māori.* Due to small sample size, the responses were combined and recoded as 0 = *know no Te Reo Māori at all* and 1 = *know a few words and basic greetings but not learning anything new* to *have a good understanding of Te Reo Māori but do not speak Māori.*

(d) How much of the kawa/protocol did you understand of a tangi or unveiling you attended? Participants responded on a 4-point scale coded as: 1 = *all or most,* 2 = *about half,* 3 = *some,* 4 = *none.* The responses were combined and recoded as 0 = *none* and 1 = *some to all or most.*

(e) How well can you understand what is said in Māori language TV or radio programmes? Participants responded on a 5-point scale coded as: 1 = *most or all of what is said,* 2 = *about half of what is said,* 3 = *some of what is said,* 4 = *none of what is said,* 5 = *do not listen to Māori language programmes.*

The responses were combined and recoded to 0 = *do not listen or understand none of what is said* and 1 = *understand some to most of what is said.*

(f) Overall how satisfied are you with your knowledge? Participants responded on a 4-point scale ranging from 1 = *very satisfied* to 4 = *very unsatisfied.* The responses were combined and recoded as 0 = *unsatisfied or very unsatisfied* and 1 = *satisfied or very satisfied.*

Each of these items were summed together to create an overall Māori knowledge score, for Māori participants the mean was 4.01 (SD = 1.47) with a range from one to six.

Perception. The Māori participants were asked 11 questions relating to perceptions. These included:

(a) Which of the following best describes your cultural affiliation / identification? The participants responded on a 3-point scale coded as: 1 = *I feel most comfortable in Māori cultural settings,* 2 = *I feel most comfortable in non-Māori cultural settings,* 3 = *I am equally comfortable in Māori and non-Māori cultural settings.* These responses were recoded into 0 = *I am most comfortable in non-Māori cultural settings* and 1 = *I am most comfortable in Māori cultural settings or equally comfortable in Māori and non-Māori cultural settings.*

(b) How comfortable do you feel in Māori social surroundings?

(c) How comfortable do you feel in Pākehā/European social surroundings? For items (b) and (c) the participants responded on a 5-point scale coded as: 1 = *very uncomfortable*, 2 = *uncomfortable,* 3 = *indifferent,* 4 = *comfortable,* 5 = *very comfortable.* These responses were recoded as 0 = *uncomfortable or very uncomfortable* and 1 = *indifference, comfortable or very comfortable.*

(d) Over the past 12 months, do you think you have been treated unfairly on the basis of your ethnicity in any of the following six settings or situations: an educational establishment; in your employment or when getting a job; when getting medical care; by Police or in the Courts; on the street or in a public setting; other setting? The responses were coded 0 = *yes* or 1 = *no.*

(e) Over the past months, have you felt emotionally upset as a result of how you were treated on the basis of your ethnicity? The responses were coded as 0 = *yes,* or 1 = *no.*

(f) How important is it to you to be recognised as Māori?

The participants responded on a four-point Likert scale ranging from 1 = *very important, to* 4 = *unimportant.* These responses were combined and recoded to 0 = *not very important or unimportant* or 1 = *important or very important.* These items were summed together to create an overall Māori perception score, with higher scores indicating more positive perceptions toward Māori affiliation and treatment based on their ethnicity. For the Māori participants the mean was 9.04 (SD = 2.72) with a range from 2–11.

Engagement and Connection. The Māori participants were asked 28 questions relating to engagement and connection with Māori culture and whānau. These included:

(a) In the past 12 months how often have you attended a marae?

(b) In the past 12 months how often have you attended your marae or local urban marae? For (a) and (b) the participants responded with the number of times they attended. The responses were coded to 0 = *none* and 1 = *at least once.*

(c) Have you received any education in Māori culture, including language, songs, cultural practices or genealogy from any of the following 10 sources: parents; relatives; a marae; preschool; primary school; secondary school; polytechnic, university or similar; work; part of community or sports group or other sources? For each source the participants responded with 0 = *no* or 1 = *yes.*

(d) Are you currently a member of any Māori group, Māori organisation or Māori sports team?

(e) Have you belonged to a kapa haka group in the past three years?

(f) Have you ever belonged to a kapa haka group?

(g) Have you ever attended a tangi or unveiling?

For items (d)–(g) the responses were recorded as 0 = *no* or 1 = *yes.*

(h) How many times per week do you listen to Māori language radio or TV programmes?

(i) How many times per week do you listen to English language Māori radio or TV programmes?

(j) How many times per week do you read English language Māori magazines or articles on Māori issues?

(k) In the past 12 months, how many times have you met with members of your extended whanau?

For each of these items (h–k) the participants responded with the number of times. These responses were recoded into 0 = *none* or 1 = *at least once.*

(l) In the past 12 months have you met with your extended whānau at any of the following eight places or events: annual hui; kōhanga/kura; wedding; tangi/unveiling; sports; kapa haka; wānanga; other?

For each of the eight places or events, the participants responses were coded 0 = *no* to 1 = *yes.* These items were summed together to create an overall Māori engagement and connection score, for the Māori participants. The mean was 10.23 (SD = 6.39) with a range from 0–26.

Māori cultural affiliation score 21–25 years old. The highest score for each item at either interview age (21 or 25 years) was taken, then all 45 items spanning knowledge, perception, engagement and connection were summed together to create an overall Māori cultural affiliation score for the Māori participants. Higher scores reflected more knowledge, engagement, connection and positive perceptions towards Māori affiliation and treatment

based on ethnicity between the ages of 21–25. This scale had a high internal consistency (α = .89), with the Māori participants scores ranging from 5–42 with a mean (SD) score of 23.28 (9.09).

Māori cultural affiliation 40-years old. At the age 40 interview, the participants were asked a series of questions totalling 45 items relating to knowledge, perception, engagement, and connection. These were identical to those asked at the 21- and 25-year interviews. The items were summed together to create an overall Māori cultural affiliation score at age 40. Higher scores reflected more knowledge, engagement, connection and positive perceptions towards Māori affiliation and treatment based on ethnicity. This scale had high internal consistency (α = .89), with the Māori participant scores ranging from 2 to 54 with a mean score of 32.85 and SD 10.66.

Chapter 4: Study 1, Predicting the Onset of Parenthood

5.1 Onset of Parenthood

Examinations of the onset of parenthood over the past few decades have seen two prominent trends. Firstly, for most countries the rates of teenage and adolescent parents have been declining (Breheny & Stephens, 2008; Pawar, Jackson, & Page, 2014; Van der Klis et al., 2002). Secondly, there is an increase in parents who delay the onset of parenthood until later in life (Botting & Dunnell, 2000; Heffner, 2004; Schmidt et al., 2012; Statistics New Zealand, 2001; Umberson et al., 2010). Despite these trends, research examining the onset of parenthood is predominantly focused on young parents, therefore, information regarding delayed onset of parenthood is relatively scarce.

As reviewed in Chapter 2, various research studies have been dedicated to understanding the factors associated with both early and delayed onset of parenthood. Longitudinal, cross-sectional, qualitative and event history analysis research designs have been used to identify factors associated with both early and delayed onset of parenthood. Based on this empirical literature, there is some evidence indicating early onset of parenthood is associated with child and adolescent experiences, whereas delayed parenthood is associated with adulthood choices.

Research regarding early onset of parenthood has often become synonymous with young mothers (Thornberry et al., 1997). As reviewed in Chapter 2, whether the samples were based on single sex or mixed gender samples, there were relatively consistent findings in factors predicting early parenthood. Earlier onset of parenthood was found to be associated with a range of disadvantageous experiences during childhood and adolescence. These included being raised by disruptive parental figures, greater exposure to family dysfunction, less educational involvement and attainment, as well as individual characteristics or behaviours during adolescence that would be considered deviant or precocious (Archibald,

2004; Boden et al., 2008; Manlove, 1997; Marie et al., 2011; McLanahan & Bumpass, 1988; Pears et al., 2005; Wellings et al., 1999; Woodward et al., 2001; Woodward et al., 2006). One of the most prominent associations within the empirical literature was the association between lower socioeconomic status or class and earlier parenthood (Dearden et al., 1994; Fagot et al., 1998; Hobcraft & Kiernan, 2001; Pears et al., 2005; Van der Klis et al., 2002). Based on the literature it appears that an accumulation of adversity during childhood and adolescence spanning the domains of family socio-demographic background, family functioning, education and individual characteristics and traits all increase the likelihood of earlier onset parenthood (Manlove, 1997; Mirowsky & Ross, 2002).

From a historical perspective, a range of events have contributed to delays in parenthood including an increase of women attaining higher qualifications, greater participation in the workforce and increased female autonomy regarding fertility due to greater access and availability of contraception and reproductive treatments (Botting & Dunnell, 2000; Dickson et al., 2000; Khawaja et al., 2006; Mills et al., 2011; Schmidt et al., 2012; Sobotka, 2010). However, research into delays in parenthood is scarce. Unlike early onset of parenthood, there is no research suggesting that childhood and adolescent factors were associated with delayed parenthood. Instead, there is some limited evidence indicating that delayed parenthood is associated with time-dynamic factors across the adult life course. These factors include choices regarding education, employment, and partner selection beyond adolescence (Kravdal, 1994; Ravanera & Fernando, 2004; Schmidt et al., 2012; Sobotka, 2010; Taniguchi, 1999). Based on the findings in the literature, it has been suggested that delayed onset of parenthood is more likely to be an active decision based on financial, economic and relationship security and stability.

In summary, based on existing literature there is evidence to suggest that early and delayed onset of parenthood are preceded by difference factors at different stages in life.

Whereas early onset of parenthood is more likely to be associated with adverse experiences during childhood and adolescence, delayed onset of parenthood is more likely to be associated with advantageous life choices and opportunities throughout adulthood. To date, no research has documented the onset of parenthood across the life span in a birth cohort.

When examining the onset of parenthood across a large proportion of the life course, the best research design is a longitudinal study that has prospectively measured factors associated with the onset of parenthood. Birth cohorts like the Christchurch Health and Development Study (CHDS) and the National Child Development Study (NCDS; Dearden et al., 1994; Manlove. 1997) are two of the few longitudinal birth cohort studies to publish papers identifying factors associated with the onset of parenthood. As discussed in Chapter 2, an advantage of well-conducted longitudinal studies like the NCDS and the CHDS is that they do not suffer from the same limitations as longitudinal age-specific cohorts or cross-sectional research that dominates the parenthood literature. In relation to this dissertation, the strength of the CHDS lies in its collection of prospective measures throughout the life course, which ensures there is control for a wide range of measures of social, family and individual factors that may be associated with the onset of parenthood.

5.2 The Onset of Parenthood for Mothers and Fathers

As discussed in Chapter 1, there is an abundance of evidence to suggest that there is a sex effect for the onset of parenthood, with women transitioning into parenthood at a younger age than men. This effect is not only observed in national statistics in New Zealand, but also in the CHDS cohort (Woodward et al., 2006). Considering mothers have historically been the primary caregiver and women have higher rates of earlier parenthood than men, it is unsurprising that parenthood research has become synonymous with young mothers. As discussed in Chapter 2, when identifying factors associated with parenthood, with the exception of a few papers that identified gender differences (Taylor, 2009; Wellings et al.,

1999; Woodward et al., 2006) most research using either male or female samples reported similar findings, indicating that the factors associated with the onset age of parenthood are relatively generalisable for males and females. Due to the limitations of existing literature (e.g. single sex sample, cross-sectional design) outlined in Chapter 2, the extent of the generalisability is uncertain. As previously noted, the strengths of the CHDS allow the current study to address these limitations and examined differences between mothers and fathers in the onset of parenthood.

5.3 Māori and Non-Māori: The Onset of Parenthood

There is strong evidence indicating that in New Zealand Māori are more likely to have a higher onset rate of early parenthood than non-Māori (Cribb, 2009; Families Commission, 2008; Statistics New Zealand, 2019b). Of the limited research that exists, it can be suggested that for the most part, the factors predictive of parenthood are generalisable across Māori and non-Māori (Marie et al., 2011). This indicates that the pathway to early parenthood is consistent between Māori and non-Māori, but these factors do not account for the higher rate of parenthood among Māori. This has led researchers to suggest Māori ethnic identity or Māori culture is associated with earlier parenthood. In contrast, little is known about patterns of delayed parenthood among Māori and how these compare to non-Māori. Therefore, the current research will be the first to examine factors associated with delayed parenthood, by comparing Māori and non-Māori.

As discussed in Chapter 2, Māori traditionally held a positive perception of parenthood regardless of age, as this allowed the continuation of whakapapa (lineage). Except for kaupapa research, Māori perceptions of parenthood are rarely reflected in existing research. Furthermore, Māori culture is alluded to as a contributing factor to early parenthood, without including measures of Māori culture in statistical models of parenthood. The current research

will address this limitation by examining the role of cultural affiliation in the onset of parenthood.

5.4 Extension to Previous CHDS Publications

As discussed in Chapter 1, the CHDS has produced several publications examining the onset of earlier parenthood, all of which are relatively consistent with existing empirical literature. However, the majority of the publications by the CHDS are limited to examining the onset of parenthood to early or mid-twenties. The study in this chapter will extend the previous work of the CHDS in three distinct ways. Firstly, the sample ranges from ages 16 to 40, which allows for examining the factors associated with delays in parenthood. Secondly, it is the first study using CHDS data to examine time-dynamic factors across the life course as predictors of parenthood. Thirdly, it will be the first study to examine the role of cultural affiliation in the onset of parenthood within the CHDS Māori cohort.

5.5 Purpose of this Study

The purpose of this research is to extend previous research by examining the onset of parenthood between the ages of 16 and 40 years and identify any variations as a result of sex at birth or Māori descent. This study will expand upon pre-existing research by utilising a longitudinal birth cohort that has collected prospective measures already identified as being associated with parenthood. As early and delayed onset of parenthood are both likely to be associated with factors at different stages of life, this study will be staged to examine childhood and adolescent factors and time-dynamic factors separately, then develop a model that best describes the onset of both earlier and delayed onset of parenthood. Therefore, the aims of this study are to:

1. Examine differences in the onset age of parenthood by sex at birth as well as between Māori and non-Māori;
2. Identify what factors are predictive of the onset age of parenthood;

3. Identify the extent to which factors explain differences in the onset age of parenthood (main effects) between mothers and fathers as well as Māori and non-Māori;
4. Identify the extent to which the strength of factors that are predictive of the onset age of parenthood are different between males and females as well as Māori and non-Māori (interactions);
5. Explore within the Māori cohort the role of cultural affiliation as a factor that is predictive of the onset age of parenthood.

5.6 Methods

5.7 Demographic Measures

5.7.1 Characteristics of the Sample

The analysis for this Chapter is based on a sample of 1,055 participants (534 females, 521 males) for whom information was available on the onset of parenthood up to age 40 years. The sample represented 83.4% of the initial birth cohort of 1,265 participants. In addition, data were missing on some of the covariates used in the analysis of risk factors/predictors due to variations in the timing and nature of the assessments. These variations in sample sizes are noted in the tables. To examine the possible impact of sample attrition on the representativeness of the analysis sample, Appendix Table A1 shows the associations between a series of measures of sample socio-demographic characteristics measured at birth and the likelihood of inclusion in the analysis. The table shows evidence of statistically significant tendencies for the analysis sample to underrepresent children born into single parent families (p <.001), low family socioeconomic status (p <.01), families characterized by lower parental education (p < .05), and younger age of mothers (p <.05). These findings suggest evidence of selection bias reflecting slightly higher rates of sample

attrition amongst families from more socioeconomically disadvantaged backgrounds. However, sample attrition was unrelated to either gender or ethnicity.

5.7.2 Onset Age of Parenthood

For this study, the onset age of parenthood was classified as the earliest age in which the participant reported giving birth or fathering their first biological child. This included both parents who lived with their child (residential) and those who did not (non-residential). A total of 765 participants had become parents by age 40.

5.7.3 Māori Descent

For the description of the Māori cohort based on Māori descent, refer to general methods (see section 3.3.3). A total of 173 (16.40%) participants were identified as Māori and 882 (83.60%) participants were identified as non-Māori.

5.8 Prospective Childhood Measures Prior to the Onset of Parenthood

To examine the extent to which the timing of early parenthood was influenced by an individual's earlier childhood and adolescent experiences, a series of measures was obtained from the CHDS database reflecting childhood and adolescent characteristics. The identification of these measures was based on previous research linking these factors to the transition to parenthood. The details of each measure used in the current analyses are described in Chapter 3.

5.9 Time-Dynamic Variables

To examine the extent to which timing of parenthood was influenced by an individual's changing circumstances, factors relating to relationship, employment, welfare, mental health, substance use, educational pursuit and attainment were identified for inclusion in this analysis. The choice of these measures was based on previous research linking these factors to the transition to later onset of parenthood (Garrison et al., 1997; Mills et al., 2011;

Nilsen et al., 2012; Ravanera & Fernando, 2004; Schmidt et al., 2012). The details of each measure used in the analyses are described below.

5.9.1 Personal Circumstances

Duration of Relationship. At each interview from 18 to 35 years, participants were asked how long they had been in a relationship with their current spouse. Partner relationships were defined as living with their partner as cohabitants or legally married at the time of the interview. The duration was defined at each interview as the total number of months with their current partner, ranging from a minimum of one month to a maximum of 98 months. Participants with no partner were coded as zero months. For ease of interpretation in the analyses, the total number of months was divided by 12 to give the total number of years, and therefore the values ranged from 0 to 8.17. Due to the time-dynamic nature of this measure, the mean and standard deviation of the duration spent in a relationship within each interview period is presented below in Table 2.

Table 2
The mean and standard deviation of the duration of relationship at each interview age

Interview Age	Mean (SD)
18	0.38 (0.69)
21	1.07 (1.48)
25	2.47 (2.52)
30	3.20 (3.16)
35	4.78 (3.51)

Note: sample sizes ranged from 962–1024

5.9.2 Employment and Welfare

Full-time Employment. At each interview from 18 to 35 years, participants were asked, “Since the previous interview, how many months have you worked in full-time employment?” Participants who had not been in full-time employment were coded as zero months. The maximum number of months was restricted to the length of the interview period

of interest, ranging from 24 to 60 months. For the purposes of this study and ease of interpretation, the total number of months of full-time employment at each interview was divided by 12 to show the number of years the participant had been in full-time employment. The distribution of the years spent in full-time employment within each interview period is presented is below in Table 3.

Table 3:
The range, mean and standard deviation of years spent in full-time employment for interview period.

Interview Age Interval	Minimum–Maximum Years	Mean (SD)
16–18	0–2	0.16 (0.37)
18–21	0–3	1.36 (1.13)
21–25	0–4	2.59(1.40)
25–30	0–5	3.70 (1.80)
30–35	0–5	3.50 (1.97)

Note: sample sizes ranged from 962–1024

Part-time Employment. At each interview from 18 to 35 years, participants were asked, "Since the previous interview, how many months have you worked in part-time employment?" Participants who reported never working in part-time employment were coded as zero months. The maximum number of months was restricted to the length of the interview period of interest, ranging from 24 to 60 months. For the purposes of this study and ease of interpretation, the total number of months of part-time employment at each interview was divided by 12 to show the number years the participant had been in part-time employment. The distribution of years spent in part-time employment for each interview period is presented in Table 4.

Table 4:
The range, mean and standard deviation of years spent in part-time employment for interview period

Interview Age Interval	Minimum–Maximum Years	Mean (SD)
16–18	0–2	0.34 (0.62)
18–21	0–3	0.82 (0.98)
21–25	0–4	0.69 (1.10)
25–30	0–5	0.63 (1.26)
30–35	0–5	0.67 (1.37)

Note: Sample sizes ranged from 962–1024

Unemployment. At each interview from 18 to 35 years, participants were asked, "*Since the previous interview, how many months have you been unemployed and looking for work?*" Participants who reported never being unemployed during the interview period were coded as zero months. The maximum number of months was restricted to the length of the interview period of interest, ranging from 24 to 60 months. For the purposes of this study and ease of interpretation, the total number of months of unemployment at each interview was divided by 12 to show the number of years the participant had been unemployed. The distribution of years spent in unemployment for each interview period is presented in Table 5.

Table 5:
The range, mean and standard deviation of years spent in unemployment for each interview period.

Interview Age Interval	Minimum–Maximum	Mean (SD)
16–18	0–2	0.10 (0.29)
18–21	0–3	0.32 (0.59)
21–25	0–4	0.24 (0.59)
25–30	0–5	0.11 (0.50)
30–35	0–5	0.12 (0.47)

Note: sample sizes ranged from 962–1024

Government / Social Welfare Assistance. At each interview from 18 to 35 years, participants were asked, "*Since the previous interview, have you ever been in receipt of a government/social welfare benefit, and if so for how long?*" Benefits included but were not limited to: unemployment benefit, domestic purposes benefit, and sickness/invalid benefit. Participants who reported never receiving a welfare benefit during the interview period were coded as zero months. The maximum number of months was restricted to the length of the interview period of interest, ranging from 24 to 60 months. For the purposes of this study and ease of interpretation, the total number of months of receiving government/social welfare assistance at each interview was divided by 12 to show the number of years the participant had been reviewing government/social welfare assistance. The distribution of each variable during an interview period is presented in Table 6.

Table 6:
The range, mean and standard deviation of the years receiving government social welfare assistance for each interview period.

Interview Age Interval	Minimum–Maximum	Mean (SD)
16-18	0–2	0.15 (0.42)
18-21	0–3	0.27 (0.55)
21-25	0–4	0.64 (1.16)
25-30	0–5	0.47 (1.25)
30-35	0–5	0.42 (1.21)

Note: Sample sizes ranged from 962–1024.

5.9.3 Mental Health and Substance Use

At each assessment from age 15-35 years, detailed information was obtained on aspects of the individual's mental health and psychosocial adjustment since the previous assessment. When participants were 15 and 16 years old, symptoms of psychiatric and behavioural disturbances were assessed using an interview approach predominately based on

the work of McGee et al., (1990) in the Dunedin Multidisciplinary Health and Development Study (DMHDS). The DMHDS is a parallel study of another cohort of New Zealand children born in Dunedin. This approach was taken to ensure comparability between the findings of the CHDS and the DMHDS. Interviews were conducted with both the child and the parent at different sites (the parent was interviewed at home and the participant at school) by different interviewers. For each participant, parental consent to interview the child was obtained. The interviews utilised a combination of standardised assessed instruments (see below) and custom written survey items to assemble a series of items that were suitable for classifying adolescents according to DSM-III-R (American Psychiatric Association, 1987) symptom criteria for a range of disorders.

Between the ages of 18 and 35 years old, participants were questioned about their psychiatric symptoms, using an interview that combined relevant components of the Comprehensive International Diagnostic Interview (CIDI) (World Health Organization, 1993) with custom written survey items to classify participants according to the DSM-IV (American Psychiatric Association, 2000) symptom criteria for a similar range of disorders.

The specific disorder measures used in this study are described below, and span the following domains: major depression, anxiety disorder, alcohol use disorder and illicit substance use disorder. In each case the disorder classifications have been defined for each of the interview periods 14-16, 16-18, 18-21, 21-25, 25-30 and 30-35 years. Some components of the descriptions closely replicate prior accounts of these measures reported in CHDS publications, in order to maintain the consistency of the description of the measures across study publications (as requested by the CHDS). A detailed description of the assessment and derivation of these measures against DSM criteria is provided in the appendix.

Major Depression: At ages 15 and 16 years, depressive symptoms were assessed using the abbreviated self- and parent-report versions of the Diagnostic Interview Schedule

for Children (DISC) (Costello et al., 1982) used by McGee et al. (1990). Because the DISC version suitable for assessing DSM-III-R major depression criteria was not available at the time this research was planned, the items were supplemented by items from the Diagnostic Interview Schedule (DIS; Robins et al., 1981) to address the DSM-III-R depression criteria that were not covered in the original version of the instruments, as described by Fergusson et al., (1993). Separate questioning was conducted to assess both current (past month) symptomatology and depressive symptoms over the previous 12 months. Participants were classified as having major depression at the ages of 15 and 16 if, based on either parent- or self-report they met DSM-III-R symptom criteria for a major depressive episode at the time of the interview or over the 12 months prior to the interview (See Appendix B for additional detail on the disorder classifications). The use of a combined parent/self-report measure has previously been shown to provide an optimal method of classification of disorder for these data (Fergusson et al., 1993). For the purposes of this study, the data were combined over the two assessments to construct a dichotomous measure reflecting whether the participant met diagnostic criteria for major depression at any time over the two-year interval from age 14-16 years. For this sample, 12.86% were defined as having major depression between 14-16 years old.

At ages 18, 21-, 25-, 30- and 35-years depression was assessed using CIDI items to assess depressive symptoms, supplemented by custom written items to assessment impairment of functioning, and classified according to DSM-IV symptom criteria. Separate questioning was conducted to assess depressive symptoms occurring in the past 4 weeks, the past 12 months and the remainder of the time interval since the previous assessment. Participants were classified as having major depressive disorder if they met DSM-IV criteria (American Psychiatric Association, 2000) for at least one major depressive episode at any time since the previous interview. For the purposes of this study, participants who met

diagnostic criteria for a major depressive episode at any time during the interview period since the previous assessment were classified as having major depression during that interval: 16-18 (22.07%), 18-21 (23.54 %), 21-25 (21.93%), 25-30 (21.18%) and 30-35 (18.61%) years.

Anxiety disorder: At age**s** 15 and 16, participants were assessed on DSM-III-R symptom criteria for a range of anxiety disorders (overanxious disorder, social phobia and simple phobia) using the abbreviated version of the DISC described by McGee et al. (1990). Questioning was supplemented by items from the DIS (Robins et al., 1981) for the assessment of generalised anxiety disorder (GAD), since the DISC version suitable for assessing DSM-III-R criteria for GAD was not available at the time the research was planned (see Fergusson et al., 1993). A parallel interview was conducted the child's parents. For each disorder, participants were classified as having the disorder in a given interview period if they met diagnostic criteria for the disorder on the basis of either self- or parent-report. (See Appendix B for additional detail on the disorder classifications). For the purposes of the current study, the disorder classifications were combined over informants and across interview periods to provide a single dichotomous measure reflecting whether the participant met criteria for any anxiety disorder over the period from age 14-16 years. For this sample, 28.53% were classified as having an anxiety disorder over this period.

At interview ages 18, 21, 25, 30, 35 years old, participants were interviewed to assess their experience of anxiety disorders since the previous assessment. Interviews were conducted using the relevant components of the CIDI, supplemented by custom written items to assess DSM-IV diagnostic criteria for the following disorders: generalised anxiety disorder, panic disorder, agoraphobia, specific phobia and social phobia (See Appendix B for additional detail on the disorder classifications). For the purposes of the present analysis the disorder classifications were combined to produce a single indicator for each interview

period, reflecting whether the participant met diagnostic criteria for any anxiety disorder since the previous assessment: 16-18 (17.09%), 18-21 (12.86 %), 21-25 (18.15%), 25-30 (18.74%) and 30-35 (18.50%) years.

Alcohol Use Disorder: At ages 15 and 16, participants and their parents were questioned in detail about the young person's use of alcohol and problems associated with alcohol use in the previous 12 months. Self-report data on problems associated with alcohol use was assessed using the Rutgers Alcohol Problems Index (RAPI; White & Labouvie, 1989), whereas parental report was based on custom written items assessing the parent's knowledge and perceptions of their child's use of alcohol (see Fergusson et al., 1993). This information was used to classify participants according to DSM-III-R diagnostic criteria for alcohol abuse (See Appendix B for additional detail on the disorder classifications). For the purposes of the study, the parent- and self-report diagnostic classifications were combined across source and across the two interview periods to derive a single measure reflecting whether the young person met criteria for alcohol abuse on the basis of either self or parent report at any time in the two year interval from age 14-16 years. Based on this definition, 10.58% of the sample were classified as meeting criteria for alcohol abuse over this period.

At ages 18, 21, 25, 30 and 35 years, participants were questioned about problems related to alcohol use since the previous assessment using the relevant CIDI items (World Health Organization, 1993) to assess DSM-IV symptom criteria for both alcohol abuse and alcohol dependence (See Appendix B for additional detail on the disorder classifications). Separate questioning was conducted for each 12-month period since the previous assessment. For the purposes of this study, participants were classified as having an alcohol use disorder if they met diagnostic criteria for either alcohol abuse or alcohol dependence at any time during the period since the previous assessment: 16-18 (19.43%), 18-21 (29.18%), 21-25 (23.23%), 25-30 (13.88%) and 30-35 years (14.76%).

Illicit Substance Use Abuse: At ages 15 and 16 years, participants and their parents were questioned about the young person's use of illicit drugs since the previous assessment including cannabis, solvents, uppers, downers, and other prescription medicines, heroin, opiates, cocaine and other substances. Participants were questioned using custom written items to assess quantity/frequency of use and problems associated with drug use. Parents were asked to report their impressions of their child's engagement in illicit drug use. This information was used to classify participants according to DSM-III-R diagnostic criteria for illicit substance abuse (See Appendix B for additional detail on the disorder classifications). For the purposes of the study the substance abuse classifications were combined across sources and over time to create a composite measure reflecting whether the participant was classified as meeting criteria for illicit substance abuse on the basis of either self or parent report over the interval from age 14-16 years. Using this definition 4.05% of the sample met criteria for illicit substance use disorder over this interval.

At ages 18, 21, 25, 30 and 35 years, participants were questioned about their use of illicit substances since the previous assessment and problems associated with substance use. Separate questioning was conducted concerning the use of cannabis and the use of other substances (including solvents, sedatives, methamphetamine, heroin, morphine and other opiates, cocaine, ecstasy, BZP or other party pills, LSD and other hallucinogens, other prescription medicines and any other substances used to create a high). Questioning about substance related problems was conducted using items from the CIDI to assess DSM-IV symptom criteria for substance abuse and substance dependence (See Appendix B for additional detail on the disorder classifications). Using these data participants were classified as to whether they met DSM-IV diagnostic criteria for the following substance use disorders in each interview period: cannabis abuse, cannabis dependence, other illicit substance abuse, other illicit substance dependence. For the purposes of the present study the diagnostic

classifications were combined into a single measure for each interview period reflecting whether the participant met criteria for any illicit substance use disorder in that interval. Based on this classification the rates of illicit substance use disorder in each interview period were: 16-18 (12.21%); 18-21 (15.33%); 21-25 (14.96%); 25-30 (8.71%) and 30-35 years (8.32%).

5.9.4 Educational Pursuit and Attainment

Enrolled in Study Full-time. At each interview from age 21–35 years old, the participants were asked, "Since the previous interview have you been enrolled in study full-time at a University, Polytech or any other educational establishment?" At the 21- and 25-year-old interviews, enrolment in full-time study was recorded for each 12-month interval since the previous assessment. Due to changes in the questionnaire reflecting the smaller number of participants studying, the 30- and 35-year-old interviews recorded enrolment in full-time study over the entire period since the previous interview. Based on the responses, the participants were coded as either: 0 = *not enrolled in study full-time* or 1 = *enrolled in study full-time* during the interval of interest. The distribution of the sample enrolled in full-time study during the interview period is reported in Table 7.

Enrolled in Study Part-time. At each interview from age 21–35 years, the participants were asked, "Since the previous interview have you been enrolled in study part-time at a University, Polytech or other educational establishment?" At the 21- and 25-year-old interviews, enrolment in part-time study was recorded for each 12-month interval since the previous assessment. Due to changes in the questionnaire reflecting the smaller number of participants studying, the 30- and 35-year-old interviews recorded enrolment in part-time study over the entire period since the previous interview. Based on the responses, the participants were coded as either: 0 = *not enrolled in study part-time* or 1 = *enrolled in study*

part-time during the interval of interest. The distribution of the sample enrolled in part-time study during the interview period is reported in Table 7.

Table 7:
Percentage of participants enrolled in study full-time and part-time for interval period

	Enrolment Interval			
Enrolled	18–21	21–25	25–30	30–35
N (%) Full-time Study	1011 (66.47)	1003 (40.68)	987 (14.69)	962 (9.46)
N (%) Part-time Study	1011 (56.38)	1003 (17.35)	987 (17.53)	962 (17.46)

Note: The annual interview periods recorded at the 21- and 25-year-old interviews have been combined over the assessment period.

Highest Qualification. At each interview from age 18–35 years old, participants were asked, "*Since the previous interview, have you obtained any qualifications?*" The participants were coded on their highest qualification ever obtained. They were coded as: 0 = *No qualifications,* 1 = *High School or basic tertiary qualification (e.g. NCEA level 4 or lower);* 2 = *Tertiary qualification (e.g. NCEA level 5 or 6);* 3 = *Bachelor's degree;* 4 = *Higher degree (e.g. Masters, PhD, MD)*. A distribution of the percentage of participants and their highest attained qualification is displayed in Table 8.

Table 8:
Percentage of highest qualification obtained by interview age

Interview Age	Highest Qualification Attained				
	No Qualification	High School or Basic Tertiary Qualification	Tertiary Qualification	Bachelor's Degree	Higher Degree
18	19.14	80.86	-	-	-
21	12.44	81.10	2.66	3.60	-
25	8.92	57.50	8.82	23.24	1.52
30	7.68	52.80	10.99	24.55	3.98
35	6.82	51.66	11.28	24.93	5.31

Note: The sample size across the variables ranges from 1024–1055.

5.10 Māori Cultural Affiliation

Māori cultural affiliation score 21–25. Higher scores reflected more knowledge, engagement, connection and positive perceptions towards Māori affiliation and treatment based on Māori ethnicity. Refer to Chapter 3 General Methods for a detailed description. For the Māori participants the mean score was 23.28 (SD = 9.09) with a range from 5–42 with a good internal consistency ($\alpha = .89$).

5.11 Statistical Analyses

This section describes the statistical methods used in this chapter. Statistical analyses were conducted using SAS® 9.4M3 software (SAS Institute Inc, 2015), and graphs were constructed using the STATA Statistical Software 15.1 (StataCorp, 2017). In line with the key aims of this chapter, analyses were conducted in the following sequence.

5.11.1 Describing Differences in the Onset of Parenthood Between Mothers and Fathers and Māori and Non-Māori

Initially life table methods (Collett, 2015; Lawless, 2011; Lee & Wang, 2003) were applied to produce Kaplan–Meier estimates of the accumulative rate of parenthood in the

cohort from age 16–40 years. Rates of parenthood were estimated for the total cohort, then separately by sex at birth (females, males); by Māori descent (Māori, non-Māori); and by sex at birth and Māori descent (Māori females, non-Māori females, Māori males, non-Māori males). In each case observations were censored either at the point of transition into parenthood or the age at which the participant was lost to follow-up. The log-rank test (Collett, 2015; Lawless, 2011; Lee & Wang, 2003) was used to test for group differences in the cumulative rates of parenthood over time.

5.11.2 Developing an Initial Statistical Model

To further explicate differences between mothers and fathers as well as Māori and non-Māori a Cox proportional hazards regression model (Cox, 1972) was developed to model the rate of transition into parenthood as a function of sex at birth and Māori descent. The Cox model was selected because it can simultaneously evaluate the effect of several factors (or covariates) on the rate of parenthood (for details see Appendix C). An initial model was considered with the form:

$$h_i(t) = h_0(t) \exp[\beta 1 S_i + \beta 2 M_i] \qquad (1)$$

In this model $h_i(t)$ represents the hazard or instantaneous rate of transition into parenthood for individual i at time (age) t; $h_0(t)$ is an arbitrary baseline hazard function; S_i and M_i are dichotomous (0,1) variables representing the individual's sex (female = 1) and Māori by descent (Māori = 1) respectively; B1, B2 are regression coefficients reflecting the effects of sex and Māori descent respectively; and exp[ ] represents the base of natural logarithms (e) raised to the power of the expression in [ ]. A useful measure of effect size arising from this model is the hazard ratio (HR). The HR represents the proportional increase (or decrease) in hazard arising from a one-unit change in a predictor variable and is calculated as follows:

$$\text{HR (95\% confidence interval)} = \exp [\beta \pm 1.96\ SE_\beta]$$

where β is the regression coefficient for the predictor and SE_β is the corresponding standard error of the coefficient from the fitted regression model. For the model in Equation 1 it is convenient to consider the baseline hazard function $h_0(t)$ to represent the hazard function for sample members who scored zero on both S and M (i.e. who were male and non-Māori). The model assumes that the proportional increase in hazards due to the participant being female or Māori is given by the hazard ratios $e^{\beta 1}$, $e^{\beta 2}$ respectively. A test of statistical significance for each covariate in the above model can be obtained from a Wald chi-squared test or z test, which can be calculated by z = B/SE(B).

A key assumption of the Cox proportional hazards model is that within levels of a covariate the hazard ratio maintains proportionality over time. A variety of tests can be used to test proportionality (see StataCorp, 1985, p.157 for details). These include graphical methods, such as log-log plots (-log {-ln(survival)}) or plotting the Kaplan–Meier observed survival curves and comparing them with the Cox predicted curves for the same variable. Additionally, a popular test of proportional hazards are tests of non-zero slope in a generalised linear regression of the scaled Schoenfeld residuals on time (Grambsch & Therneau, 1994).

The model in Equation 1 failed the proportionality test when applied to the parenthood data (see Results in section 4.13). To address this issue an alternative epoch-specific model was used throughout the analysis. This model assumed that different hazards applied within different epochs, but that within epochs the hazards were proportional. A two-epoch model (<27 years, 27+ years) was fitted, of the form:

$$h_i(t)=h_0(t)\exp[\beta 1^{(j)}S_i^{(j)}+ \beta 2^{(j)}M_i^{(j)}] \qquad (2)$$

where $S_i^{(j)}$ (j = 1,2) were a set of epoch-specific dichotomous variables defined as equal to S_i in epoch *j* (j = 1, 2) and zero otherwise; $M_i^{(j)}$ were a corresponding set of epoch-specific variables representing Māori descent in epoch *j* (j = 1,2); $\beta 1^{(j)}$, $\beta 2^{(j)}$ were sets of epoch-

specific regression coefficients representing the specific effects of sex and Māori descent in epoch *j* (j = 1, 2); and the remaining terms had the same interpretation as in Equation 1 above.

5.11.3 Examination of Childhood and Adolescent Factors

For each childhood and adolescent risk factor, the life table method (Cutler & Ederer, 1958) was used to examine whether variations in the risk factor were associated with changes in the rate of parenthood within epochs. For the purposes of data display and to meet the requirements of the life table tests, all continuously scaled variables were classified into a series of broad class intervals. This process was repeated for each group by sex and Māori descent within epochs to explore the consistency of associations between risk factors and the cumulative rates of parenthood across sex and Māori descent. The strength of association between the risk of parenthood and the childhood or adolescent risk factor was assessed using the log-rank test. For all remaining analyses, all variables were classified in their natural state as described in the Methods section.

5.11.4 Correlations

To examine whether childhood and adolescent factors were correlated with sex at birth or Māori descent, Spearman correlations (Spearman, 1961) were used to test the strength of association between each childhood and adolescent factor with both sex and Māori descent.

5.11.5 Extending Model for Childhood and Adolescent Factors

The epoch model in Equation 2 was extended to examine childhood and adolescent factors as predictors in the timing of parenthood and was fitted in the form.

$$h_i(t)=h_0(t)\exp[\beta 1^{(j)}S_i^{(j)} + \beta 2^{(j)}M_i^{(j)} + \Sigma\beta_k^{(j)}Z_{ik}^{(j)}] \qquad (3)$$

where $Z_{ik}^{(j)}$ (j = 1,2) is a set of fixed childhood and adolescent factors (k) defined to be specific to epoch *j* (j = 1,2) and zero otherwise; $\beta_k^{(j)}$ were the regression coefficients

representing the effect of a fixed childhood or adolescent factor (*k*) to a specific epoch *j* (j = 1,2). The remaining terms had the same interpretation as in Equation 2 above. Initially the full set of childhood and adolescent factors were added to the model, then both forward and backward methods of variable selection were used to identify the best fitting and most parsimonious set of predictors (Greenland, 1989). For each risk factor in the fitted model, a test of significance was obtained from a Wald chi-square test. Estimates of the hazard ratios for sex at birth and Māori descent adjusted for childhood and adolescent factors within each Epoch were calculated from the fitted model.

5.11.6 Extending Model for Time-Dynamic Factors

Further analysis was conducted to identify possible time-dynamic predictors of onset of parenthood. Therefore, the epoch model in Equation 2 was extended to examine a range of time-dynamic factors in the timing of parenthood, which was fitted in the form:

$$h_i(t)=h_0(t)\exp[\beta 1^{(j)}S_i^{(j)} + \beta 2^{(j)}M_i^{(j)} + \Sigma\beta_d^{(j)}Z_{id(t)}^{(j)}] \qquad (4)$$

where $Z_{id(t)}^{(j)}$ (j = 1,2) is a set of time-dynamic factors (*d*) that vary for individual *i* at time (age) *t*, defined to specific epoch *j* (j = 1,2) and zero otherwise; $\beta_d^{(j)}$ were the regression coefficients representing the effect of a specific time-dynamic factor d for a specific epoch *j* (j = 1,2). The remaining terms had the same interpretation as in Equation 2 above. Initially the full set of time-dynamic variables were added to the model, then both forward and backward methods of variable selection were used to identify the best fitting and more parsimonious set of predictors (Greenland, 1989). For each time dynamic in the fitted model, a test of significance was obtained using a Wald chi-square test.

5.11.7 Final Multivariable Model

Due to differences in the fixed childhood and adolescent factors and the time-dynamic factors (see Results in section 4.16.2), a final model was developed to combine Equation 3 and Equation 4. Therefore, the model in Equation 2 was extended for the set of fixed factors

identified in Equation 3 and the set of time-dynamic factors identified in Equation 4, which was fitted in the form:

$$h_i(t)=h_0(t)\exp[\beta 1^{(j)}S_i^{(j)} + \beta 2^{(j)}M_i^{(j)} + \Sigma\beta_k^{(j)}Z_{ik}^{(j)} + \Sigma\beta_d^{(j)}Z_{id(t)}^{(j)}] \quad (5)$$

where the terms for childhood and adolescent fixed factors ($\Sigma\beta_k^{(j)}Z_{ik}^{(j)}$) in the model had the same interpretation as Equation 3. The terms for time-dynamic factors ($\Sigma\beta_d^{(j)}Z_{id(t)}^{(j)}$) in the model had the same interpretation as Equation 4. The remaining terms had the same interpretation as Equation 2. Initially the full set of childhood and adolescent factors and time-dynamic factors identified in the previous models were added to the model, then both forward and backward methods of variable selection were used to identify the best fitting and more parsimonious set of predictors (Greenland, 1989). For each factor in the model, a test of significance was obtained using a Wald chi-square test. To explore whether the nature of the relationship between specific covariates and the onset of parenthood varied with sex at birth and Māori descent, multiplicative interactions were conducted between sex and Māori descent with the covariates in the final fitted model.

5.11.8 Māori Culture, Knowledge and Engagement

Finally, supplementary analyses were conducted within the Māori cohort to explore the possible role of Māori cultural affiliation and engagement in the onset of parenthood. This was done in two stages. Firstly, I examined the association between the onset of parenthood and the extent of cultural affiliation and engagement. For data display purposes, the Māori sample was divided into three groups: earlier onset (aged 16–26 years), delayed onset (aged 27–40 years) and non-parents. Chi-square tests of independence (McHugh, 2013) were used to examine group differences for dichotomous cultural variables. An analysis of variance (ANOVA) test (Girden, 1992) was conducted to examine group differences for the total scores of each cultural classification, and the total Māori cultural score. Secondly, I examined whether a measure of Māori cultural affiliation and engagement predicts the onset of

parenthood amongst Māori, over and above the other predictors identified in Equation 5. The final model (Equation 5) was restricted to the Māori cohort and extended to include the total overall Māori cultural score in each Epoch. A Wald chi-square test of significance was constructed for the total Māori cultural score.

5.12 Results

5.13 Onset of Parenthood

5.13.1 Rates of Parenthood in the Sample

Figure 1 presents the cumulative percentage of participants who became biological parents over the interval from adolescence to age 40 based on life table estimates. The earliest onset of parenthood was 16 years old with six of the participants becoming parents.

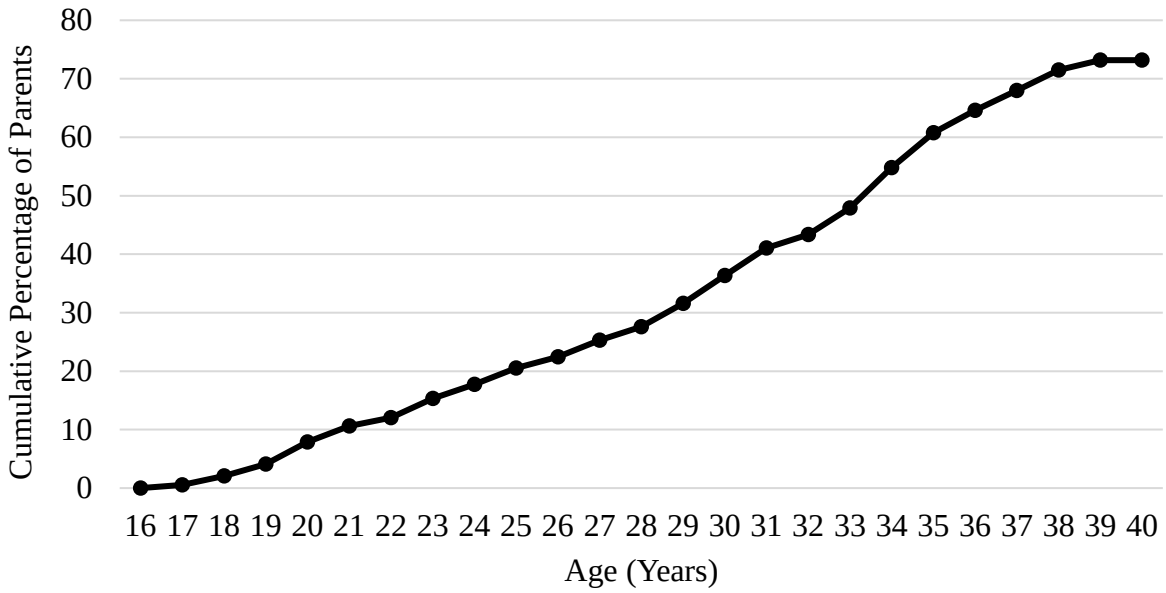

Figure 1 Proportion of participants becoming parents by age 40

Throughout the period from 16 to 25 years of age, the rate of parenthood steadily increased, whereby 20% of the participants had become parents by age 25. This rate nearly quadrupled by the end of the follow-up period, whereby 73% of the participants had become parents by age 40. Therefore, the remaining 27% of the participants had not become biological parents by age 40.

5.13.2 Sex Differences in Rates of Parenthood

Figure 2 shows the cumulative onset of parenthood with the sample stratified by sex at birth. Overall rates of parenthood were consistently higher for females than males over the study period. Up to age 26 there was a divergence in the rates, reflecting a more rapid onset of parenthood for females: by this age 25% of females had become parents compared with only 16% of males. However, after age 26 the sex at birth gap slowly decreased: by 40 years of age 78% of females become parents compared with 70% of males. A log-rank test showed that the observed sex differences were significant, $\chi^2(1) = 8.04$, $p < .05$.

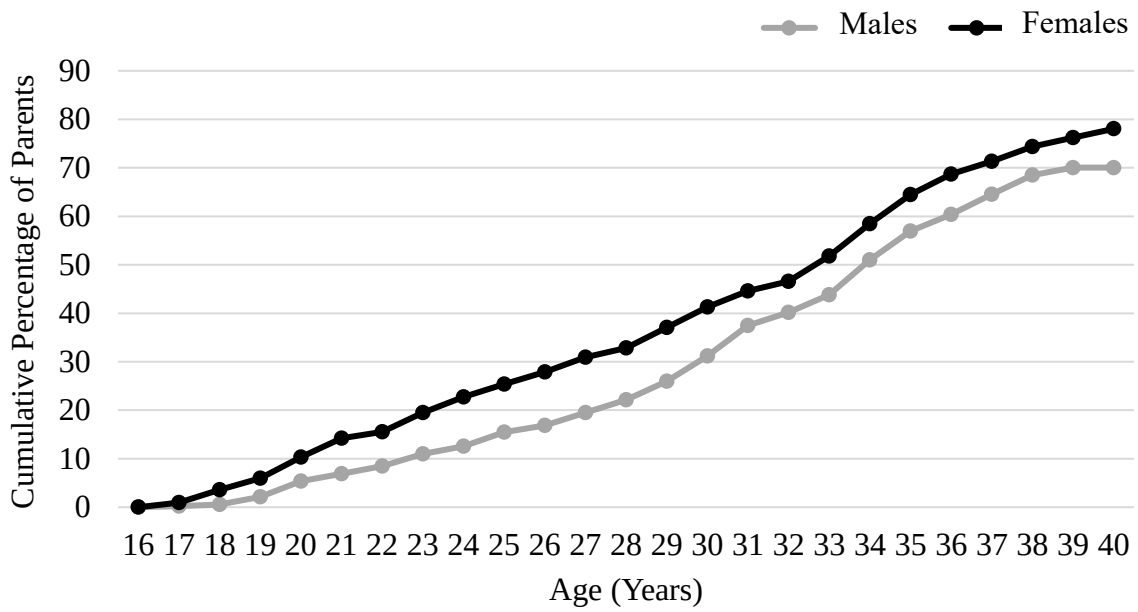

Figure 2: Cumulative percentage of females and males based on sex at birth becoming parents by age 40

5.13.3 Ethnic Identity Differences Between Māori and Non-Māori in Rates of Parenthood

Figure 3 presents the accumulative rates of parenthood to age 40 for Māori and non-Māori participants. Up to age 26, Māori displayed a more rapid transition to parenthood: by this age, 40% of Māori had become parents compared with 17% of non-Māori. However, after age 26 years the rate of transition to parenthood increased amongst non-Māori and by

age 40 the ethnic difference in the cumulative rate of parenthood had narrowed substantially (78% for Māori compared with 72% for non-Māori). A log-rank test showed these differences in ethnic identity were significant, $\chi^2(1) = 11.38$, $p < .005$.

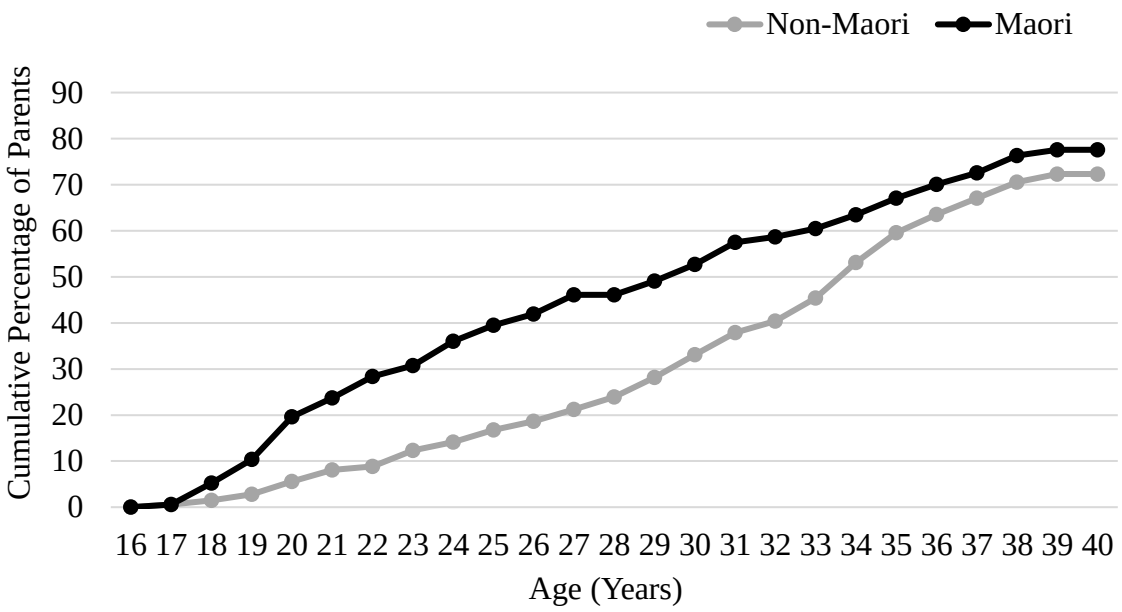

Figure 3: Cumulative percentage of Māori and non-Māori becoming parents by age 40

5.13.4 Sex and Māori Descent: Differences in Rates of Parenthood

The general trends in figures 2 and 3 are further elaborated in figure 4, which shows the accumulative onset of parenthood with the sample stratified by sex and Māori descent. The data shows a very clear pattern in which rates were higher for Māori than for non-Māori, and females were higher than males. Net effects show that Māori females typically have the highest rate of parenthood followed by Māori males, non-Māori females and non-Māori males. By age 26, Māori women (45%) and Māori men (34%) displayed higher rates of parenthood than non-Māori women (22%) and non-Māori men (12%). However, beyond 26 years old these differences begin to decline and converge until the age of 40 where there was relatively little difference between Māori females (78%) and non-Māori females (76%) but a

small difference between Māori males (78%) and non-Māori males (69%). A log-rank test showed that the gender and Māori ethnic identity differences were significant, $\chi^2(3) = 19.31$, $p < .001$.

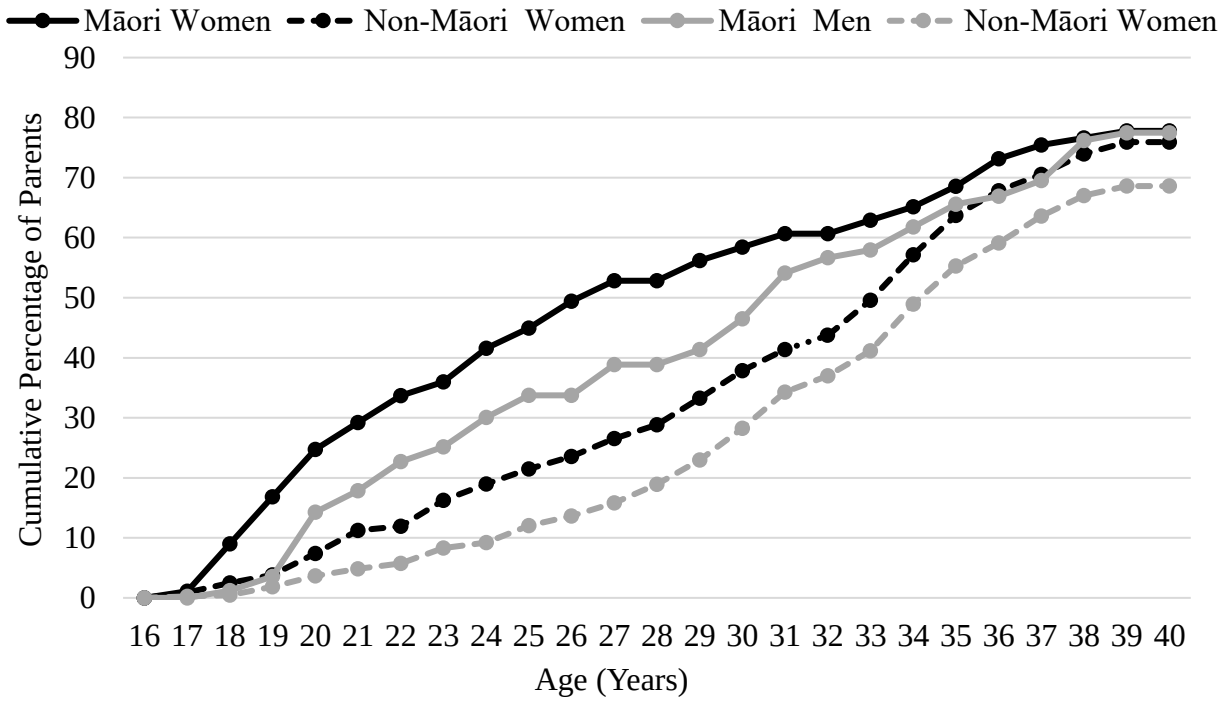

Figure 4 Cumulative percentage of the participants becoming parents by sex at birth and Māori descent by the age of 40

5.14 Fitted Cox Regression Models

5.14.1 Cox Regression Model of Parenthood in the Participants

A fitted Cox regression model was applied to the data to assess sex and Māori descent differences in the onset rate of parenthood to identify a baseline model (see Table C1 in Appendix C). However, the initial model violated the assumption of proportionality (Allison, 2014), which was most likely due to a divergence in the rates of parenthood observed up to age 26 and rates converge from age 27 onwards. Therefore, the onset age of parenthood was divided into two epochs, the first epoch ranging from age 16-26 years and the second epoch

ranging from age 27–40 years as observed in figures 2 and 3 above. To address this issue, the onset age of parenthood was divided into two epochs, the first Epoch ranging from age 16 – 26 years and the second Epoch ranging from age 27 – 40 years. The baseline model was refitted allowing Epoch specific effects of sex at birth and Māori descent on the onset of parenthood (see Statistical methods). The empirical reasons for selecting ages 26 and 27 as the demarcation point for the end of Epoch 1 and start of Epoch 2 were that it provided a natural cut point to distinguish between earlier and later onset of parenthood that was consistent with the observed onset curves, while also ensuring sufficient subsample sizes to enable robust estimation of regression effects within each Epoch. The two-Epoch model was also the most parsimonious representation of the data that satisfied the modelling assumption of proportionality of hazards.

A Cox regression model was fitted to the data to assess sex and Māori descent differences in the onset of parenthood within each epoch. The results for the fitted epoch model are presented in Table 9, which shows the fitted model parameters, standard errors, tests of significance, hazard ratios and 95% confidence intervals. The results from the fitted model in Epoch 1 show evidence of clear and statistically significant sex and Māori descent identity differences in the rate of onset of parenthood. Specifically, the onset rate of parenthood between 16 and 26 years of age was 1.73 times higher for females than males. Similarly, the onset rate of parenthood for Māori was 2.64 times higher than for non-Māori during the same period. However, these differences were not observed in Epoch 2. Between 27 and 40 years of age, the onset rate of parenthood for males and females was almost identical (hazard ratio 1.02) and the ethnic differences on the onset rate of parenthood for Māori was lower than for non-Māori (hazard ratio 0.80). The fitted epoch models were then tested for proportional hazards and showed that proportionality was not violated. The model

was also extended to test for sex at birth /Māori descent interactions, but no significant interactions were observed.

Table 9
Fitted Cox regression model of Epoch 1 and Epoch 2

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
	B (SE)	P	Hazard Ratio (95% CI)	B (SE)	P	Hazard Ratio (95% CI)
Female	0.54 (0.13)	<.0001	1.73 (1.35–2.22)	0.02 (0.09)	0.79	1.02 (0.86–1.22)
Māori	0.97 (0.13)	<.0001	2.64 (2.03–3.44)	-0.22 (0.14)	0.13	0.80 (0.60–1.07)

Note: N = 1055, $\chi^2(4) = 64.91$, $p < .001$

5.15 Predictors of Parenthood

The epoch model was used to examine the extent to which developmental processes were associated with the onset of parenthood (see Table 10), and how these varied for males and females (see Table 11) as well as Māori and non-Māori (see Table 12). These associations included measures of the participant's family of origin (family socio-economic background, structure, and functioning); earlier personal characteristics (behaviour, scholastic ability and performance) as well as adolescent factors that spanned a range of risk-taking measures and characteristics including earlier sexual risk-taking, substance use, deviant peer affiliations, novelty-seeking, neuroticism, and history of depression. For the purposes of data display all continuous measures have been classified into a series of groups or class intervals reflecting varying levels of risk or exposure to examine the extent to which variations in risk were associated with changes in the rate of parenthood. For each measure the associations are shown separately for Epoch 1 (ages 16–26) and Epoch 2 (ages 27–40), and the strengths of association were tested using the log-rank test.

5.15.1 Family of origin and individual predictors of parenthood

The associations between a series of childhood and adolescent factors describing the participant's life history and experiences prior to age 16 and onset of parenthood were

estimated using Cox regression models. The associations for each factor were modelled separately for Epoch 1 (16–26 years) and Epoch 2 (27–40 years) and a log-rank test was used to test the significance of the associations (see Table 10).[2] Examination of the associations in Table 10 leads to the following conclusions:

1. For Epoch 1, all childhood and adolescent factors in the table were significantly ($p < .05$) related to earlier parenthood (16–26 years old). Strong associations were observed between parenthood by age 26 and childhood social disadvantage, parental maladaptive behaviour, educational underachievement, adolescent adjustment problems and individual characteristics.
2. For Epoch 2, only a higher living standard was significantly ($p < .05$) related to later parenthood. However, lower levels of childhood attentional problems and early history of depression were marginally significantly ($p = .06$) associated with later onset of parenthood.

In summary, there were clear and pervasive tendencies for rates of earlier parenthood (16–26 years) to increase with increasing levels of exposure to earlier social, family and individual adversity. However, these tendencies were not observed for later parenthood (27–40 years), which suggests the factors we observed were reliably associated with earlier onset of parenthood rather than later onset of parenthood.

[2] Refer to Table D1 in appendix D for the associations in a non-epoch model (16–49 years).

Table 10
Cumulative rates of parenthood (%) in each epoch by measures of childhood and adolescent risk factors

Measure	Epoch 1 (16–26 years) N (%)	Epoch 2 (27–40 years) N (%)
Socio-demographic Background		
Family Socioeconomic Status (birth)		
Professional, managerial	217 (15.38)	177 (72.52)
Clerical, technical, skilled	574 (21.14)	440 (67.08)
Semiskilled, unskilled, unemployed	264 (42.70)	143 (65.38)
	$\chi^2(2) = 66.31$, $p < .0001$	$\chi^2(2) = 0.58$, $p = .75$
Maternal Education (birth)		
Tertiary qualification	211 (11.55)	180 (67.85)
High School qualification	319 (18.96)	252 (71.37)
No qualification	525 (34.72)	328 (65.62)
	$\chi^2(2) = 53.54$, $p < .0001$	$\chi^2(2) = 0.13$, $p = .94$
Paternal Education (birth)		
Tertiary qualification	195 (11.36)	168 (74.69)
High school qualification	337 (19.19)	262 (65.21)
No qualification	490 (33.34)	315 (67.59)
	$\chi^2(2) = 44.46$, $p < .0001$	$\chi^2(2) = 1.58$, $p = .45$
Average family living standards (0–10 years)		
Highest 51–100%	545 (14.28)	457 (73.06)
Middle 26–50%	257 (31.46)	166 (61.05)
Lowest 25%	244 (42.48)	133 (61.28)
	$\chi^2(2) = 90.10$, $p < .0001$	$\chi^2(2) = 7.15$, $p < .05$
Family Structure		
Maternal age at childbirth		
25+	639 (17.13)	510 (68.44)
20–24	323 (36.08)	202 (67.31)
<20	93 (44.20)	48 (67.26)
	$\chi^2(2) = 65.34$, $p < .0001$	$\chi^2(2) = 0.09$, $p = .96$

Measure	Epoch 1 (16–26 years) N (%)	Epoch 2 (27–40 years) N (%)
Born into two-parent family		
Yes	988 (23.25)	733 (68.12)
No	67 (55.73)	27 (66.67)
	$\chi^2(1) = 54.35$, $p < .0001$	$\chi^2(1) = .00$, $p = .99$
Childhood parental changes (0–16 years)		
None	661 (17.20)	528 (70.57)
1–2	200 (30.33)	134 (64.34)
3+	194 (47.69)	98 (59.31)
	$\chi^2(2) = 91.69$, $p < .0001$	$\chi^2(2) = 3.16$, $p = .21$
Family Functioning		
Parental IPV		
Lowest 50%	570 (22.01)	428 (69.70)
Middle 51–75%	227 (19.80)	174 (70.47)
Highest 25%	227 (36.29)	143 (62.07)
	$\chi^2(2) = 25.38$, $p < .0001$	$\chi^2(2) = 2.10$, $p = .35$
Parental history of offending		
No	844 (22.02)	640 (67.96)
Yes	129 (40.68)	71 (67.77)
	$\chi^2(1) = 26.42$, $p < .0001$	$\chi^2(1) = 0.21$, $p = .64$
Parental history of substance use/problems		
No	692 (20.58)	531 (68.90)
Yes	313 (34.23)	200 (65.38)
	$\chi^2(1) = 23.63$, $p < .0001$	$\chi^2(1) = 0.62$, $p = .43$
Parental attachment		
Highest 25%	241 (19.30)	190 (74.86)
Middle 50%	477 (24.00)	347 (65.67)
Lowest 25%	237 (32.34)	156 (68.54)
	$\chi^2(2) = 13.05$, $p < .01$	$\chi^2(2) = 4.22$, $p = .12$

Measure	Epoch 1 (16–26 years) N (%)	Epoch 2 (27–40 years) N (%)
Childhood Abuse Exposure		
Parental use of physical punishment		
Never/seldom	867 (21.06)	658 (69.64)
Regular	118 (34.12)	76 (57.94)
Severe	67 (61.19)	26 (54.81)
	$\chi^2(2) = 84.12$, $p < .0001$	$\chi^2(2) = 2.94$, $p = .23$
Childhood sexual abuse		
None/no contact	904 (22.33)	674 (69.21)
Contact no intercourse	82 (37.80)	51 (65.53)
Intercourse	66 (46.97)	35 (49.66)
	$\chi^2(2) = 36.90$, $p < .0001$	$\chi^2(2) = 3.38$, $p = .18$
Child Behaviour		
Conduct problems		
Lowest 50%	523 (17.62)	417 (70.96)
Middle 51-75%	263 (27.15)	188 (69.35)
Middle 76-90%	145 (34.41)	89 (58.50)
Highest 10%	99 (42.28)	53 (57.49)
	$\chi^2(3) = 43.29$, $p < .0001$	$\chi^2(3) = 4.89$, $p = .18$
Attentional problems		
Lowest 50%	534 (18.95)	420 (71.50)
Middle 51–75%	245 (27.55)	173 (64.17)
Middle 76–90%	151 (30.33)	98 (68.87)
Highest 10%	100 (40.57)	56 (54.10)
	$\chi^2(3) = 30.31$, $p <. 0001$	$\chi^2(3) = 7.47$, $p = .06$
School Achievement		
Scholastic ability (13 years)		
Lowest 25%	193 (31.96)	126 (61.77)
Middle 50%	364 (23.66)	267 (71.72)
Highest 25%	210 (14.89)	175 (67.27)
	$\chi^2(2) = 17.52$, $p < .001$	$\chi^2(2) = 2.27$, $p = .32$

Measure	Epoch 1 (16–26 years) N (%)	Epoch 2 (27–40 years) N (%)
Scholastic performance (11–13 years)		
Highest 25%	248 (17.10)	201 (64.92)
Middle 50%	499 (25.35)	359 (70.12)
Lowest 25%	245 (32.48)	159 (66.42)
	$\chi^2(2) = 17.57$, $p < .001$	$\chi^2(2) = 1.49$, $p = .48$
Adolescent Factors and Individual Traits		
Neuroticism (14 years)		
Low 50%	504 (20.49)	389 (67.02)
Mid 51–75%	232 (25.59)	168 (67.90)
High 25%	225 (34.06)	143 (73.17)
	$\chi^2(2) = 17.26$, $p < .001$	$\chi^2(2) = 1.85$, $p = .40$
Early regular substance use (<15 years)		
No	632 (20.48)	489 (68.82)
Yes	323 (33.53)	205 (68.88)
	$\chi^2(1) = 22.08$, $p < .0001$	$\chi^2(1) = 0.01$, $p = .91$
Deviant peer affiliation (15 years)		
Lowest 50%	442 (15.12)	363 (69.20)
Middle 51–75%	242 (25.53)	174 (69.26)
Highest 25%	271 (40.25)	156 (67.51)
	$\chi^2(2) = 61.71$, $p < .0001$	$\chi^2(2) = 0.36$, $p = .84$
Early history of depression		
No	892 (23.67)	660 (68.44)
Yes	59 (40.96)	33 (76.64)
	$\chi^2(1) = 11.69$, $p < .005$	$\chi^2(1) = 3.58$, $p = .06$
Early sexual intercourse		
No (2)	766 (17.95)	609 (69.32)
Yes (1)	258 (44.91)	136 (64.66)
	$\chi^2(1) = 91.74$, $p < .0001$	$\chi^2(1) = 0.24$, $p = .63$
Novelty seeking (16 years)		
Lowest 25%	217 (15.31)	180 (69.43)
Middle 50%	474 (24.22)	351 (68.64)
Highest 25%	253 (33.80)	160 (68.74)
	$\chi^2(2) = 21.569$, $p < .0001$	$\chi^2(2) = 0.13$, $p = .94$

Note: Analysis for Epoch 2 was limited to the participants yet to become parents by age 26. N = 1055 for Epoch 1, N = 761 for Epoch 2. However, sample size varied due to missing data for some measures. In Epoch 1, the sample size varied from 767 to 1055 participants. In Epoch 2, the sample size varied from 569 to 761 participants.

5.15.2 Family of Origin and Individual Predictors of Parenthood by Sex at Birth

The extent to which the processes identified in the previous table contribute to rates of parenthood for men and women is examined below in Table 11, whereby the associations between childhood and adolescent factors and the onset of parenthood are shown by sex at birth for each epoch separately.[3] Examination of the associations in Table 11 leads to the following conclusions:

1. The findings in Epoch 1 were relatively consistent with those previously reported in Table 10, except for a few factors that were no longer significantly associated with earlier onset of parenthood. These include factors relating to parental history of maladaptive behaviour and early history of depression for males, and neuroticism for females. However, all remaining factors were significantly ($p < .05$) associated with earlier parenthood for both males and females. It is important to note that although females had a higher rate of early parenthood; there was a clear and pervasive pattern of association for both males and females such that the rates of early parenthood increased with greater exposure to adversity and disadvantage. This is reflected in the sex profiles of relative risk for the onset of early parenthood and the factors listed in Table 11. For females the relative risks ranged from 1.32 to 3.53 with a median of 2.26, similarly males ranged from 1.05 to 4.77 with a median of 2.23. In summary, for both males and females the earlier onset of parenthood was strongly associated with aspects of social, family and individual adversity.

[3] Refer to Table E1 in appendix E for associations by sex within the non-epoch model (16–40 years).

2. For Epoch 2, only one significant (p <.05) association was observed, an earlier history of depression for females. However, maternal education level was nearing significance for males (p=.06). Due to the lack of other significant associations, no pattern of association were observed for the onset of later parenthood. This is evident when comparing the sex profiles of relative risk for the onset of later parenthood and all the measures listed in Table 11. The relative risk for females ranged from 1.01 to 3.46 with a median of 1.62, and males ranged from 1.41 to 3.23 with a median of 2.33. In summary, despite the sex specific associations of early mental health and maternal education with the later onset of parenthood, broadly speaking there was little evidence to suggest that childhood and adolescent processes play a prominent role in the later onset of parenthood.

In summary the findings observed in Table 11 were consistent with those observed previously in Table 10, suggesting that exposure to adverse circumstances in childhood is associated with the earlier onset of parenthood similarly for both males and females. However, childhood and adolescent processes have a very limited role in the onset of later parenthood, and these may be sex specific.

Table 11
Cumulative rates (%) of parenthood for males and females based on sex at birth by measures of childhood and adolescent covariates.

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Female	Male	Female	Male
Measure	N (%)	N (%)	N (%)	N (%)
Socio-demographic Background				
Family Socio-economic Status (birth)				
Professional, managerial	119 (18.63)	98 (11.40)	94 (73.47)	83 (71.49)
Clerical, technical, skilled	291 (26.95)	283 (15.08)	210 (66.09)	230 (67.98)
Semi-skilled, unskilled, unemployed	124 (52.40)	140 (34.18)	56 (67.13)	87 (64.27)
$\chi^2(2)$	47.44, $p < .0001$	27.08, $p < .0001$	1.54, $p = .46$	0.12, $p = .94$
Maternal Education (birth)				
Tertiary qualification	115 (12.31)	96 (10.66)	98 (75.61)	82 (58.31)
High School qualification	150 (22.84)	169 (15.51)	113 (71.03)	139 (71.64)
No qualification	269 (43.45)	256 (25.50)	149 (61.25)	179 (69.39)
$\chi^2(2)$	45.01, $p < .0001$	11.94, $p < .01$	4.20, $p = .12$	5.26, $p = .07$
Paternal Education (birth)				
Tertiary qualification	103 (12.79)	92 (9.80)	86 (75.70)	82 (73.68)
High School qualification	159 (25.81)	178 (13.22)	117 (62.91)	145 (67.04)
No qualification	256 (39.86)	234 (26.15)	151 (67.97)	164 (67.24)
$\chi^2(2)$	27.46, $p < .0001$	17.18, $p < .001$	2.86, $p = .24$	0.06, $p = .97$
Average family living standards (0–10years)				
Highest 51–100%	283 (17.07)	262 (11.25)	231 (73.53)	226 (72.58)
Middle 26–50%	131 (39.83)	126 (22.80)	75 (58.94)	91 (62.86)
Lowest 25%%	118 (54.28)	126 (31.42)	53 (59.85)	80 (62.35)
$\chi^2(2)$	75.14, $p < .0001$	25.38, $p < .0001$	3.98, $p = .14$	3.27, $p = .20$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Female	Male	Female	Male
Measure	N (%)	N (%)	N (%)	N (%)
Family Structure				
Maternal age at childbirth				
25+	333 (19.69)	306 (14.32)	261 (71.21)	249 (65.52)
20–24	151 (45.30)	172 (28.00)	81 (59.86)	121 (72.74)
<20	50 (62.79)	43 (22.17)	18 (62.41)	30 (70.00)
$\chi^2(2)$	70.52, $p < .0001$	13.87, $p < .005$	2.20, $p = .33$	2.41, $p = .30$
Born into two-parent family				
Yes	500 (28.04)	488 (18.32)	351 (68.52)	382 (67.78)
No	34 (73.53)	33 (36.91)	9 (55.56)	18 (72.22)
$\chi^2(1)$	56.28, $p < .0001$	9.30, $p < .005$	0.49, $p = .48$	0.31, $p = .58$
Childhood parental changes (0–16 years)				
None	328 (19.69)	333 (14.73)	257 (70.61)	271 (70.54)
1–2	99 (34.70)	101 (26.05)	63 (67.03)	71 (61.88)
3+	107 (61.81)	87 (30.13)	40 (55.00)	58 (62.55)
$\chi^2(1)$	85.17, $p < .0001$	15.44, $p < .005$	2.72, $p = .26$	1.35, $p = .51$
Family Functioning				
Parental IPV				
Lowest 50%	281 (25.07)	289 (19.04)	206 (69.52)	222 (69.87)
Middle 51–75%	115 (24.77)	112 (14.68)	83 (69.43)	91 (71.46)
Highest 25%	124 (45.36)	103 (25.36)	67 (61.80)	76 (62.74)
$\chi^2(1)$	21.85, $p <.0001$	4.56, $p = .10$	0.49, $p = .78$	1.76, $p = .42$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Female	Male	Female	Male
Measure	N (%)	N (%)	N (%)	N (%)
Parental history of offending				
No	432 (25.59)	412 (18.24)	316 (69.20)	324 (66.77)
Yes	63 (59.44)	66 (22.90)	24 (55.10)	47 (74.38)
$\chi^2(1)$	41.77, $p < .0001$	0.97, $p = .33$	1.41, $p = .24$	2.42, $p = .12$
Parental history of substance use/problems				
No	338 (24.36)	354 (16.94)	251 (69.16)	280 (68.69)
Yes	172 (42.20)	141 (24.48)	97 (65.90)	103 (64.87)
$\chi^2(1)$	19.67, $p < .0001$	3.79, $p = .05$	0.29, $p = .59$	0.35, $p = .56$
Parental attachment				
Highest 25%	131 (22.90)	110 (15.04)	101 (72.37)	89 (77.73)
Middle 50%	230 (30.73)	247 (17.68)	154 (65.28)	193 (66.00)
Lowest 25%	124 (38.12)	113 (25.96)	75 (74.08)	81 (63.43)
$\chi^2(2)$	7.68, $p < .02$	5.86, $p = .05$	2.00, $p = .37$	4.50, $p = .11$
Childhood Abuse Exposure				
Parental use of physical punishment				
Never/seldom	447 (25.94)	420 (15.81)	323 (69.64)	335 (69.67)
Regular	43 (37.70)	75 (32.11)	26 (60.44)	50 (56.50)
Severe	42 (73.81)	25 (40.00)	11 (45.45)	15 (63.43)
$\chi^2(2)$	64.93, $p < .0001$	21.53, $p < .0001$	1.81, $p = .41$	1.56, $p = .46$
Childhood sexual abuse				
None / no contact	412 (27.22)	492 (18.20)	291 (70.03)	383 (68.58)
Contact no intercourse	67 (37.31)	15 (40.00)	42 (64.32)	9 (72.22)
Intercourse	53 (49.06)	13 (38.46)	27 (53.54)	8 (37.50)
$\chi^2(2)$	16.76, $p < .001$	9.55, $p < .05$	2.14, $p = .34$	1.65, $p = .44$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Female	Male	Female	Male
Measure	N (%)	N (%)	N (%)	N (%)
Child behaviour				
Conduct problems				
Lowest 50%	308 (20.65)	215 (13.26)	238 (72.65)	179 (68.71)
Middle 51-75%	130 (38.69)	133 (15.89)	78 (60.70)	110 (75.74)
Middle 76-90%	58 (55.17)	87 (20.08)	26 (54.77)	63 (60.05)
Highest 10%	26 (50.83)	73 (39.24)	12 (75.00)	41 (51.88)
$\chi^2(3)$	47.89, $p < .0001$	28.43, $p < .0001$	6.43, $p = .09$	5.42, $p = .14$
Attentional problems				
Lowest 50%	343 (23.56)	191 (10.66)	255 (71.56)	165 (71.38)
Middle 51–75%	110 (41.88)	135 (15.78)	63 (63.26)	110 (64.85)
Middle 76–90%	41 (48.78)	110 (23.34)	21 (68.32)	77 (69.02)
Highest 10%	28 (43.74)	72 (39.33)	15 (46.67)	41 (57.24)
$\chi^2(3)$	27.19, $p < .0001$	35.54, $p < .0001$	3.09, $p = .38$	4.59, $p = .21$
School achievement				
Scholastic ability				
Highest 25%	81 (40.77)	112 (25.54)	47 (60.52)	79 (62.71)
Middle 50%	196 (28.89)	168 (17.57)	135 (71.45)	132 (71.92)
Lowest 25%	115 (22.74)	95 (5.35)	87 (70.59)	88 (63.88)
$\chi^2(2)$	9.13, $p < .05$	15.12, $p < .005$	0.82, $p = .66$	1.75, $p = .42$
Scholastic performance				
Highest 25%	166 (21.25)	82 (8.68)	128 (65.82)	73 (63.38)
Middle 50%	256 (34.58)	243 (15.56)	164 (72.73)	195 (67.93)
Lowest 25%	82 (36.62)	163 (30.40)	51 (61.28)	108 (69.12)
$\chi^2(2)$	11.25, $p < .01$	23.56, $p < .0001$	1.98, $p = .37$	0.54, $p = .76$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Female	Male	Female	Male
Measure	N (%)	N (%)	N (%)	N (%)
Adolescent Factors and Individual Traits				
Neuroticism (14 years)				
Low 50%	214 (26.79)	290 (15.81)	155 (68.40)	234 (66.08)
Mid 51–75%	119 (30.38)	113 (20.52)	81 (62.90)	87 (72.55)
High 25%	156 (36.09)	69 (29.42)	97 (75.37)	45 (66.54)
$\chi^2(2)$	4.29, $p = .12$	7.70, $p = .02$	5.22, $p = .07$	0.67, $p = .72$
Early regular substance use (<15 years)				
No	328 (24.26)	304 (16.38)	242 (66.57)	246 (71.03)
Yes	157 (43.48)	166 (23.92)	88 (76.93)	117 (62.48)
$\chi^2(1)$	20.76, $p < .0001$	4.77, $p = .03$	2.58, $p = .11$	2.42, $p = .12$
Deviant peer affiliation (15 years)				
Lowest 50%	208 (16.96)	234 (13.48)	168 (68.56)	195 (69.95)
Middle 51–75%	128 (34.58)	114 (15.28)	82 (70.42)	92 (68.27)
Highest 25%	149 (45.83)	122 (33.30)	80 (70.48)	76 (64.31)
$\chi^2(2)$	37.40, $p < .0001$	24.50, $p < .0001$	0.20, $p = .91$	0.24, $p = .89$
Early history of depression				
No	439 (28.41)	453 (19.06)	309 (68.50)	351 (68.41)
Yes	44 (48.30)	15 (20.00)	21 (82.69)	12 (66.67)
$\chi^2(1)$	9.73, $p < .005$	0.03, $p = .87$	4.09, $p < .05$	0.21, $p = .64$
Early sexual intercourse				
No	385 (20.95)	381 (14.92)	297 (67.74)	312 (70.86)
Yes	135 (55.33)	123 (33.25)	59 (69.76)	77 (60.68)
$\chi^2(1)$	70.13, $p < .0001$	24.07, $p < .0001$	0.37, $p = .55$	1.38, $p = .24$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Female	Male	Female	Male
Measure	N (%)	N (%)	N (%)	N (%)
Novelty seeking (16 years)				
Lowest 25%	114 (21.98)	103 (7.86)	88 (68.48)	92 (70.31)
Middle 50%	238 (29.08)	236 (19.29)	166 (68.45)	184 (68.81)
Highest 25%	126 (39.93)	127 (27.61)	74 (71.70)	86 (66.20)
$\chi^2(2)$	9.71, $p < .05$	14.06, $p < .005$	0.19, $p = .91$	0.36, $p = .84$

Note: Analysis for Epoch 2 was limited to the participants yet to become parents by age 26. N = 1055 for Epoch 1, N = 761 for Epoch 2. However, sample size varied due to missing data for some measures. For Epoch 1 the sample size varied from 767 to 1055 participants, with female numbers ranging from a minimum of 392 to a maximum of 534 across measures in Epoch 1, and male numbers ranging from 375 to 521. In Epoch 2, the sample size varied from 569 to 761 participants. For females the sample varied from 270 to 361 participants across measures, with male sample size ranging from 299 to 400 participants.

5.15.3 Family of Origin and Individual Predictors of Parenthood Between Māori and Non-Māori

The examination of processes that might contribute to differential rates of early parenthood between Māori and non-Māori are shown below in Table 12, where the associations between childhood and adolescent factors and the onset of parenthood by Māori and non-Māori for each epoch are reported separately.[4] Examination of the associations in Table 12 leads to the following conclusions:

1. Differences between Māori and non-Māori were observed in Epoch 1. For non-Māori all of the childhood and adolescent factors were significantly associated with earlier onset of parenthood with the exception of parental attachment during adolescence ($p = .19$) which was non-significant. In contrast, for Māori only 11 childhood and adolescent factors were significantly ($p < .05$) associated with earlier parenthood. These factors included lower family socioeconomic status at birth, born into a single-parent family, childhood parental changes, parental substance use problems, parental use of physical punishment, childhood sexual abuse, less parental attachment, scholastic ability, neuroticism, early regular substance use and deviant peer affiliations. Despite Māori having significantly higher rates of early parenthood than non-Māori, similar patterns of association were observed for both Māori and non-Māori. The rates of earlier parenthood increased with greater adversity and disadvantage. This similarity is reflected in the ethnic profiles of relative risk for the onset of early parenthood and the factors listed in Table 12. For Māori, the relative risks ranged from 1.07 to 3.46 with a median of 1.62, while for non-Māori ranged from 1.41 to 3.23 with a median of

[4] Refer to Table F1 in appendix F for the associations between Māori and non-Māori within the non-epoch model (16 – 40 years).

2.33. In summary, earlier onset of parenthood was strongly associated with aspects of social, family and individual adversity for both Māori and non-Māori, although the risk profiles differed to some extent.

2. For Epoch 2, only three significant ($p < .05$) associations were observed, each one being either Māori or non-Māori specific: lower levels of adolescent attentional problems and early history of depression for non-Māori, and greater parental attachment levels for Māori. In summary, despite the three Māori descent specific associations observed, broadly speaking, childhood and adolescent processes did not play a prominent role in the later onset of parenthood.

In summary there were differences in the associations between the childhood and adolescent factors with both earlier and later onset of parenthood. These findings suggest that exposure to adverse circumstances in childhood is associated with earlier onset of parenthood for Māori and non-Māori. However, childhood and adolescent processes have a limited role in the onset of later parenthood and may be specific to Māori ethnic identity.

Table 12
Accumulation rates (%) of parenthood for Māori and non-Māori by measures of childhood and adolescent covariates

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Māori	Non-Māori	Māori	Non-Māori
Measure	N (%)	N (%)	N (%)	N (%)
Socio-demographic Background				
Family Socio-economic Status (birth)				
Professional, managerial	20 (25.00)	197 (14.36)	15 (48.67)	162 (74.70)
Clerical, technical, skilled	98 (38.06)	476 (17.65)	59 (70.25)	381 (66.55)
Semi-skilled, unskilled, unemployed	70 (57.75)	194 (37.27)	28 (53.57)	115 (68.47)
$\chi^2(2)$	12.46, $p<.01$	41.95, $p<.0001$	3.84, $p = .15$	1.82, $p = .40$
Maternal Education (birth)				
Tertiary qualification	14 (28.57)	197 (10.30)	10 (52.00)	170 (68.75)
High school qualification	50 (40.49)	269 (14.99)	29 (65.52)	223 (72.18)
No qualification	124 (47.14)	401 (30.88)	63 (62.49)	265 (66.32)
χ^2 (2)	2.58, $p = .28$	43.35, $p < .0001$	0.48, $p = .79$	0.13, $p = .94$
Paternal Education (birth)				
Tertiary qualification	9 (0.00)	186 (11.92)	9 (55.56)	159 (75.83)
High school qualification	59 (41.30)	278 (14.54)	33 (64.94)	229 (65.26)
No qualification	107 (45.18)	383 (30.03)	57 (61.96)	258 (68.87)
$\chi^2(2)$	5.81, $p = .06$	35.44, $p<.0001$	0.30, $p = .86$	1.91, $p = .39$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Māori	Non-Māori	Māori	Non-Māori
Measure	N (%)	N (%)	N (%)	N (%)
Average family living standards (0–10 years)				
Highest 51–100%	55 (31.31)	490 (12.38)	37 (65.94)	420 (73.71)
Middle 26–50%	54 (50.68)	203 (26.27)	26 (65.38)	140 (60.24)
Lowest 25%%	78 (48.85)	166 (39.50)	38 (58.94)	95 (62.06)
$\chi^2(2)$	5.99, $p = .05$	68.45, $p < .0001$	1.05, $p = .59$	5.85, $p = .05$
Family Structure				
Maternal age at childbirth				
25+	75 (34.77)	564 (14.77)	48 (56.81)	462 (69.68)
20–24	81 (50.76)	242 (31.16)	39 (70.45)	163 (66.52)
<20	32 (48.51)	61 (41.93)	15 (60.00)	33 (70.25)
$\chi^2(2)$	4.17, $p = .12$	48.79, $p < .0001$	1.51, $p = .47$	0.84, $p = .66$
Born into two-parent family				
Yes	162 (40.32)	826 (19.89)	95 (61.80)	638 (69.08)
No	26 (67.62)	41 (48.78)	7 (71.43)	20 (65.00)
$\chi^2(1)$	9.22, $p < .01$	30.53, $p < .0001$	0.11, $p = .74$	0.002, $p = .97$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Māori	Non-Māori	Māori	Non-Māori
Measure	N (%)	N (%)	N (%)	N (%)
Childhood parental changes (0–16 years)				
None	79 (30.62)	582 (15.38)	54 (64.32)	474 (71.29)
1–2	40 (42.80)	160 (27.20)	22 (63.64)	112 (64.34)
3+	69 (60.13)	125 (40.89)	26 (57.69)	72 (59.69)
$\chi^2(2)$	14.61, $p < .005$	51.89, $p < .0001$	0.25, $p = .88$	2.27, $p = .32$
Family Functioning				
Parental IPV				
Lowest 50%	87 (39.48)	483 (18.86)	51 (63.41)	377 (70.58)
Middle 51–75%	34 (32.35)	193 (17.57)	23 (65.22)	151 (71.28)
Highest 25%	59 (54.70)	168 (29.86)	26 (59.12)	117 (62.63)
$\chi^2(2)$	5.79, $p = .06$	12.65, $p < .005$	0.40, $p = .82$	1.50, $p = .47$
Parental history of offending				
No	131 (38.55)	713 (18.99)	79 (64.26)	561 (68.49)
Yes	41 (49.25)	88 (36.72)	19 (52.63)	52 (73.16)
$\chi^2(1)$	2.09, $p = .15$	18.25, $p < .0001$	1.01, $p = .32$	2.11, $p = .15$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Māori	Non-Māori	Māori	Non-Māori
Measure	N (%)	N (%)	N (%)	N (%)
Parental history of substance use / problems				
No	103 (36.29)	589 (17.84)	63 (69.68)	468 (68.79)
Yes	76 (50.36)	237 (29.05)	37 (51.35)	163 (68.72)
$\chi^2(1)$	4.22, $p < .05$	13.69, $p < .001$	2.20, $p = .14$	0.01, $p = .93$
Parental attachment				
Highest 25%	29 (35.22)	212 (17.16)	18 (83.33)	172 (73.93)
Middle 50%	80 (35.57)	397 (21.68)	49 (68.26)	298 (65.20)
Lowest 25%	57 (56.14)	180 (24.74)	25 (45.19)	131 (73.06)
$\chi^2(2)$	8.35, $p < .05$	3.73, $p = .16$	8.75, $p < .05$	2.71, $p = .26$
Childhood Abuse Exposure				
Parental use of physical punishment				
Never/seldom	138 (35.14)	729 (18.39)	87 (65.28)	571 (70.32)
Regular	28 (54.08)	90 (27.95)	12 (50.00)	64 (59.48)
Severe	19 (84.21)	48 (52.08)	3(33.33)	23 (57.84)
$\chi^2(2)$	30.13, $p < .0001$	44.09, $p < .0001$	1.56, $p = .46$	1.78, $p = .41$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Māori	Non-Māori	Māori	Non-Māori
Measure	N (%)	N (%)	N (%)	N (%)
Childhood sexual abuse				
None/no contact	156 (39.51)	748 (18.74)	91 (63.49)	583 (70.11)
Contact, no intercourse	17 (58.82)	65 (32.31)	7 (71.43)	44 (64.52)
Intercourse	12 (66.67)	54 (42.59)	4 (25.00)	31 (52.99)
$\chi^2(2)$	8.96, $p < .05$	28.86, $p < .0001$	2.05, $p = .36$	2.68, $p = .26$
Child behaviour				
Conduct problems				
Lowest 50%	70 (34.36)	453 (15.01)	45 (67.58)	372 (71.38)
Middle 51–75%	52 (43.08)	211 (22.30)	28 (62.23)	160 (70.63)
Middle 76–90%	32 (46.88)	113 (30.80)	17 (52.94)	72 (59.90)
Highest 10%	29 (59.55)	70 (35.19)	11 (63.64)	42 (55.48)
$\chi^2(3)$	7.30, $p = .06$	27.64, $p < .0001$	0.90, $p = .83$	4.10, $p = .25$
Attentional problems				
Lowest 50%	79 (37.97)	455 (15.60)	49 (69.39)	371(71.76)
Middle 51–75%	49 (47.58)	196 (22.58)	25 (59.02)	148 (65.05)
Middle 76–90%	33 (36.68)	118 (28.45)	18 (50.00)	80 (73.16)
Highest 10%	22 (59.09)	78 (35.36)	9 (66.67)	47 (51.85)
$\chi^2(3)$	5.43, $p = .14$	23.44, $p < .0001$	3.80, $p = .29$	10.56, $p < .05$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Māori	Non-Māori	Māori	Non-Māori
Measure	N (%)	N (%)	N (%)	N (%)
School achievement				
Scholastic ability				
Highest 25%	37 (51.86)	156 (27.22)	16 (62.50)	110 (61.60)
Middle 50%	66 (36.36)	298 (20.79)	42 (65.06)	225 (72.99)
Lowest 25%	20 (15.00)	190 (14.88)	17 (70.59)	158 (66.84)
$\chi^2(2)$	9.39, $p < .05$	8.14, $p < .05$	0.07, $p = .97$	2.62, $p = .27$
Scholastic performance				
Highest 25%	35 (34.29)	213 (14.22)	23 (65.22)	178 (64.87)
Middle 50%	95 (41.32)	404 (21.60)	55 (59.52)	304 (72.09)
Lowest 25%	46 (50.39)	199 (28.31)	20 (70.00)	139 (65.90)
$\chi^2(2)$	4.55, $p =.10$	12.59, $p < .01$	1.61, $p = .45$	2.88, $p = .24$
Adolescent Factors				
Neuroticism (14 years)				
Low 50%	86 (38.94)	418 (16.71)	51 (66.25)	338 (67.14)
Middle 51–75%	44 (34.09)	188 (23.55)	27 (62.96)	141 (68.85)
High 25%	41 (58.54)	184 (28.58)	17 (64.71)	125 (74.37)
$\chi^2(2)$	7.65, $p < .05$	12.42, $p < .005$	0.28, $p = .87$	2.04, $p = .36$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Māori	Non-Māori	Māori	Non-Māori
Measure	N (%)	N (%)	N (%)	N (%)
Early regular substance use (<15 years)				
No	97 (35.30)	535 (17.78)	62 (69.28)	426 (68.76)
Yes	69 (52.81)	254 (28.31)	30 (56.67)	175 (71.08)
$\chi^2(1)$	6.46, $p < .05$	12.55, $p < .001$	0.74, $p = .39$	0.07, $p = .79$
Deviant peer affiliation				
Lowest 50%	60 (27.02)	382 (13.25)	43 (70.72)	320 (69.00)
Middle 51–75%	41 (44.74)	201 (21.65)	21 (69.31)	153 (69.26)
Highest 25%	65 (55.51)	206 (35.41)	28 (53.57)	128 (70.69)
$\chi^2(2)$	12.22, $p < .005$	41.66, $p < .0001$	2.89, $p = .24$	1.03, $p = .60$
Early history of depression				
No	151 (41.50)	741 (20.05)	85 (65.72)	575 (68.84)
Yes	14 (50.00)	45 (38.10)	7 (57.14)	26 (82.35)
$\chi^2(1)$	0.35, $p = .55$	11.43, $p < .005$	0.02, $p = .88$	5.80, $p < .05$
Early sexual intercourse				
No (2)	112 (39.36)	654 (14.26)	67 (62.23)	542 (70.21)
Yes (1)	68 (49.21)	190 (43.37)	33 (63.64)	103 (64.85)
$\chi^2(1)$	2.50, $p = .11$	92.46, $p < .0001$	0.001, $p = .98$	0.06, $p = .81$

	Epoch 1 (16–26 years)		Epoch 2 (27–40 years)	
	Māori	Non-Māori	Māori	Non-Māori
Measure	N (%)	N (%)	N (%)	N (%)
Novelty seeking (16 years)				
Lowest 25%	34 (44.12)	183 (9.93)	19 (73.68)	161 (68.94)
Middle 50%	83 (42.58)	391 (20.34)	46 (60.35)	304 (69.91)
Highest 25%	49 (41.22)	204 (32.03)	28 (67.86)	132 (68.88)
$\chi^2(2)$	0.002, $p = .99$	28.15, $p < .0001$	1.60, $p = .45$	0.65, $p = .72$

Note: Analysis for Epoch 2 was limited to the participants yet to become parents by age 26. N = 1055 for Epoch 1, N = 761 for Epoch 2. However, sample size varied due to missing data for some measures. For Epoch 1, sample sizes varied from 767 to 1055, with the Māori sample varying from 123 to 188, and the non-Māori ranging from 644 to 867 across measures in Epoch 1. For Epoch 2, sample sizes varied from 569 to 761, with those for Māori ranging from 75 to 102 and for non-Māori ranging from 494 to 659 across measures.

5.15.4 Correlations

The Spearman correlations for sex at birth and Māori descent with each of the 23 childhood and adolescent factors gender is reported in Table 13. No significant correlations were observed between sex and socio-demographic background, family structure or family functioning variables. However, more sexual abuse, lower rates of conduct and attentional problems, greater scholastic performance, and higher neuroticism were weakly correlated with females. Additionally, greater scholastic ability, lower deviant peer affiliation and higher risk of early history of depression was very weakly correlated with females. There were no other significant correlations between the remaining childhood abuse exposure and adolescent factors and individual trait variables.

In contrast, adverse socio-demographic background variables as well as younger maternal age, being born in a single-parent home, and a greater number of childhood parental changes were weakly or very weakly correlated with Māori descent. Additionally, higher levels of family dysfunctional behaviour, increased parental use of physical punishment, increased child behavioural problems, a lower level of scholastic ability, greater deviant peer affiliation, early substance use and early sexual intercourse were all weakly correlated with Māori descent.

Table 13
Spearman correlations between variables and sex at birth and Māori descent

Measure	Mean (SD)	Female	Māori
Socio-demographic Background			
Family socio-economic status	1.93 (0.68)	0.05	−0.15**
Maternal education	1.68 (0.77)	0.00	−0.17**
Paternal education	1.70 (0.76)	−0.03	−0.15**
Average family standard of living	3.13 (0.47)	0.04	−0.24**
Family Structure			
Maternal age at childbirth	25.81 (4.90)	0.01	−0.19**
Born into a two-parent family	0.92 (0.27)	−0.01	−0.14**
Childhood parental changes	1.18 (2.43)	0.03	0.22**
Family Functioning			
Parental IPV	9.24 (2.34)	0.05	0.10*
Parental history of offending	0.13 (0.34)	−0.02	0.15**
Parental history of substance use/problems	0.31 (0.46)	0.06	0.11*
Parental attachment	72.85 (9.69)	−0.01	−0.11*
Childhood Abuse Exposure			
Parental use of physical punishment	2.20 (0.61)	−0.04	0.11*
Childhood sexual abuse	0.32 (0.83)	0.25**	0.02
Child Behaviour			
Conduct problems	51.92 (8.28)	−0.24**	0.13**
Attentional problems	20.11 (4.94)	−0.32**	0.11*
School Achievement			
Scholastic ability (7–13)	34.69 (15.11)	0.12*	−0.10*
Scholastic performance (11–13)	3.46 (0.86)	0.25**	0.06
Adolescent Factors and Individual Traits			
Neuroticism	14.24 (3.87)	0.21**	0.03
Early regular substance use	0.34 (0.47)	−0.03	0.08*
Deviant peer affiliation	4.46 (2.50)	0.07*	0.14**
Early history of depression	0.06 (0.24)	0.12**	0.04
Early sexual intercourse	0.25 (0.43)	0.02	0.13**
Novelty seeking	18.25 (5.13)	−0.01	0.03

*p < .05 ** p < .0001

5.16 Multivariable models

5.16.1 Fixed Factor Models

The previous results suggest that the early onset of parenthood was related to an array of childhood and adolescent factors and although there were clear sex and Māori descent

differences in the onset rate of parenthood, the various risk factors appeared to act in a similar way for both male and female as well as for Māori and non-Māori. However, these factors appear to be at best only weakly related to later onset of parenthood.

A statistical model[5] was developed to examine the extent to which all the factors previously identified in section 4.8, jointly predicted the onset of parenthood in Epoch 1 and Epoch 2. A nested Cox proportional hazards regression model was fitted using the factors in Table 10 as predictors of parenthood. In this analysis all continuous variables were scaled in their natural metric as described in the Methods section, rather than in the arbitrary categories used in Table 10.

The results for the model fitted with all the factors are summarised in Table 14, and show the fitted model parameters, standard errors, test of significance, hazard ratio and 95% confidence interval for each factor in the model. Table 14 shows the following:

- In Epoch 1 a significant sex at birth ($p < .0001$) and Māori descent ($p < .05$) difference was observed after the inclusion of childhood and adolescent factors, whereby the onset of early parenthood was 2.05 times higher for females than males (95% CI: 1.47–2.85) and onset for Māori was 1.40 times higher than non-Māori (95% CI: 1.01–1.94). The analysis also identified six factors that contributed to the prediction of early parenthood. These factors included: lower average family living standards ($p = .02$); increased parental use of physical punishment ($p = .01$); higher parental attachment ($p = .02$); lower scholastic performance ($p = .01$); higher association with deviant peers ($p = .04$); early sexual intercourse ($p= .004$) and higher novelty seeking ($p = .03$).

[5] Refer to statistical analysis section for details

- In Epoch 2, no significant sex at birth ($p = .85$) or Māori descent ($p = .32$) differences were observed. However, early history of depression ($p = .03$) was identified as contributing to the prediction of later onset of parenthood.

This model was further refined to a final model of child and adolescent factors, summarised in Table 15, which shows the fitted model parameters, standard errors, test of significance, hazard ratio and 95% confidence interval for each factor in the model. Table 15 shows the following:

- In Epoch 1, significant sex at birth ($p < .0001$) and Māori descent ($p < .005$) differences remained after the inclusion of childhood and adolescent factors, whereby the onset of early parenthood was 2.32 times (95% CI: 1.78–3.03) higher for females than males and was 1.67 times (95% CI: 1.26–2.21) higher for Māori than non-Māori. The analysis of the fitted model identified eight factors that contributed to the prediction of early parenthood. These included: lower family socioeconomic status ($p = .02$); lower average family living standards ($p < .0001$); born into a single parent family ($p = .05$); increased parental use of physical punishment ($p = .02$); lower scholastic performance ($p < .01$); greater deviant peer affiliation ($p = .004$); early sexual intercourse ($p < .001$) and greater novelty seeking ($p = .03$).
- In contrast, in Epoch 2 no significant sex at birth ($p = .79$) or Māori descent ($p = .13$) differences were found in the later onset of parenthood. Furthermore, the analysis did not identify any factors that contribute to the prediction of later parenthood.

In summary, for the final model of main effects, early onset of parenthood increased with increasing levels of exposure to earlier social, family and individual adversity. However, consistent with our previous findings, these tendencies were not observed for later

parenthood, which further suggests that the early childhood and adolescent factors were reliably associated with earlier onset of parenthood rather than later onset of parenthood.

Table 14
Cox regression of onset of parenthood adjusting for fixed factors

Variable	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
	B(SE)	*P*	HR (95% CI)	B(SE)	*P*	HR (95% CI)
Female	0.72 (0.17)	**<.0001**	2.05 (1.48–2.85)	0.00 (0.11)	0.97	1.00 (0.81–1.23)
Māori	0.31 (0.17)	**0.06**	1.37 (0.99–1.90)	−0.15 (0.15)	0.31	0.86 (0.64–1.15)
Family socioeconomic status (birth)	−0.15 (0.13)	0.25	0.86 (0.66–1.11)	−0.05 (0.10)	0.64	0.96 (0.79–1.16)
Maternal education (birth)	−0.17 (0.12)	0.21	0.86 (0.68–1.09)	−0.08 (0.07)	0.26	0.92 (0.80–1.06)
Paternal education (birth)	−0.12 (0.13)	0.35	0.89 (0.69–1.14)	0.09 (0.08)	0.29	1.09 (0.93–1.28)
Average family living standards 0–10yrs	−0.55 (0.21)	**0.01**	0.58 (0.38–0.87)	0.19 (0.13)	0.16	1.21 (0.93–1.56)
Maternal age at childbirth	−0.01 (0.02)	0.62	0.99 (0.96–1.03)	−0.02 (0.01)	0.16	0.98 (0.96–1.01)
Born into two-parent family	−0.15 (0.25)	0.56	0.86 (0.53–1.42)	0.00 (0.29)	0.99	1.00 (0.57–1.75)
Childhood parental changes	0.04 (0.03)	0.20	1.04 (0.98–1.09)	−0.02 (0.03)	0.60	0.98 (0.92–1.05)
Inter-parental violence*	−0.01 (0.03)	0.82	0.99 (0.94–1.05)	−0.01 (0.03)	0.80	0.99 (0.94–1.05)
Parental history of offending	−0.06 (0.20)	0.75	0.94 (0.64–1.39)	0.28 (0.19)	0.13	1.33 (0.92–1.91)
Parental history of substance use/problems	0.14 (0.15)	0.37	1.15 (0.85–1.55)	−0.07 (0.12)	0.55	0.93 (0.74–1.17)
Parental use of physical punishment	0.29 (0.11)	**0.01**	1.33 (1.08–1.64)	−0.08 (0.11)	0.47	0.92 (0.75–1.14)
Childhood sexual abuse	0.04 (0.08)	0.63	1.04 (0.90–1.20)	−0.15 (0.08)	0.06	0.86 (0.74–1.01)
Parental attachment*	0.02 (0.01)	**0.02**	1.02 (1.00–1.03)	0.01 (0.01)	0.18	1.01 (1.00–1.02)

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
Conduct problems*	0.00 (0.01)	0.77	1.00 (0.97–1.02)	−0.01 (0.01)	0.23	0.99 (0.96–1.01)
Attentional problems*	0.01 (0.02)	0.67	1.01 (0.97–1.06)	−0.01 (0.02)	0.55	0.99 (0.95–1.03)
Scholastic ability*	0.01 (0.01)	0.31	1.01 (0.99–1.03)	0.00 (0.01)	0.69	1.00 (0.99–1.01)
Scholastic performance (GPA)	−0.41 (0.16)	**0.01**	0.67 (0.49–0.92)	−0.12 (0.11)	0.29	0.89 (0.72–1.10)
Neuroticism*	0.03 (0.02)	0.07	1.03 (1.00–1.07)	0.02 (0.01)	0.25	1.02 (0.99–1.05)
Early regular substance use	0.03 (0.17)	0.84	1.03 (0.74–1.45)	−0.02 (0.12)	0.89	0.98 (0.77–1.25)
Deviant peer affiliation*	0.06 (0.03)	**0.06**	1.06 (1.00–1.13)	0.01 (0.03)	0.59	1.01 (0.96–1.07)
Early history of depression	0.19 (0.24)	0.43	1.21 (0.75–1.96)	0.49 (0.22)	**0.03**	1.63 (1.06–2.51)
Early sexual intercourse	0.54 (0.17)	**.002**	1.72 (1.23–2.40)	−0.05 (0.14)	0.74	0.95 (0.72–1.26)
Novelty seeking*	0.03 (0.02)	**0.03**	1.03 (1.00–1.07)	0.01 (0.01)	0.50	1.01 (0.99–1.03)

Note * HR(95% CI) are all calculated to reflect one standard deviation change in the predictor
N = 1055, $\chi^2(50) = 235.90$, $p < .0001$

Table 15
Cox regression model with fixed factors simplified

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
Fixed Factors	B(SE)	*P*	HR (95% CI)	B(SE)	*P*	HR (95% CI)
Female	0.84 (0.13)	**<.0001**	2.32 (1.78–3.03)	0.02 (0.09)	0.79	1.02 (0.86–1.22)
Māori	0.51 (0.14)	**.001**	1.67 (1.26–2.21)	−0.22 (0.14)	0.13	0.80 (0.61–1.07)
Family socio-economic status	−0.23 (0.11)	**0.04**	0.79 (0.64–0.99)			
Average family living standards 0–10 years	−0.80 (0.18)	**<.0001**	0.45 (0.32–0.64)			
Born into two-parent family	−0.47 (0.19)	**0.02**	0.63 (0.44–0.92)			
Parental use of physical punishment	0.22 (0.09)	**0.01**	1.25 (1.05–1.49)			
Scholastic performance	−0.26 (0.08)	**0.001**	0.77 (0.66–0.90)			
Deviant peer affiliation*	0.07 (0.03)	**0.01**	1.07 (1.02–1.13)			
Early sexual intercourse	0.59 (0.15)	**<.001**	1.80 (1.35–2.39)			
Novelty seeking *	0.03 (0.01)	**0.03**	1.03 (1.00–1.06)			

Note: N = 1055, Likelihood ratio χ^2 (12) = 243.70, p < .0001
* HR (95% CI) are all calculated to reflect one standard deviation change in the predictor

5.16.2 Time-dynamic Models

After adjusting for social, family and individual factors in childhood and adolescence, both sex and Māori descent differences remained significant for early onset of parenthood. However, the analyses did not identify any factors that contributed to the prediction of later onset of parenthood. To further explore this, an additional statistical model[6] was developed to examine the extent to which time-dynamic factors relating to the participant's relationship duration, education and employment may explain the time of onset of parenthood in both Epoch 1 and Epoch 2.

A nested Cox proportional hazard regression model was fitted using time-dynamic factors as predictors of parenthood. The results of the fitted model with all of the time-dynamic factors are summarised in Table 16, which shows the fitted model parameters, standard errors, test of significance, hazard ratio and 95% confidence interval for each time-dynamic factor in the model. Table 16 shows the following:

- In Epoch 1, significant sex at birth ($p < .0001$) and Māori descent ($p < .0001$) differences remained after the inclusion of time-dynamic factors. The model parameter suggests that the onset of early parenthood was 2.08 times (95% CI: 1.56–2.78) higher for females than males and for Māori were 1.98 times higher (95% CI: 1.48–2.64) than for non-Māori. The analysis identified eight time-dynamic factors that contributed to the prediction of early parenthood. These factors included: longer duration of relationship ($p < .005$); increased employment either full-time ($p < .05$) or less employment in part-time ($p < .05$), increased depression ($p = .02$); increased problems with alcohol ($p < .005$) and other substances ($p = .03$); lower attainment of qualifications ($p < .005$) and less enrolment in study full-time ($p < .005$)

[6] Refer to statistical analysis section 4.11 for details

- In Epoch 2, no significant sex at birth ($p = .44$) or Māori descent ($p = .46$) differences were observed for the later onset of parenthood. However, the analysis identified two initial time-dynamic factors that contributed to the prediction of later onset of parenthood. These included: longer duration of relationship ($p < .0001$) as well as less time receiving government social benefits ($p = .03$).

This full model was refined to a final fitted model of time-dynamic factors[7], which is summarised in Table 17 and shows the fitted model parameters, standard errors, test of significance, hazard ratio and 95% confidence interval for each factor in the model. Table 17 shows the following:

- In Epoch 1, significant sex at birth ($p < .0001$) and Māori descent ($p < .0001$) differences remained. The onset of early parenthood for females was 2.00 times (95% CI: 1.5–2.66) higher than for males and for Māori were 2.07 times (95% CI: 1.55–2.77) higher than for non-Māori. The final model identified eight, time-dynamic factors that contributed to the prediction of early parenthood. These factors included: longer duration of relationship ($p < .005$); increased employment either full-time ($p < .0001$), increased time receiving government social benefits ($p < .05$); increased depression ($p = .02$); increased problems with alcohol ($p < .01$) and other substances ($p < .05$); lower attainment of qualifications ($p = .001$) and less enrolment in full-time study ($p = .001$).
- In Epoch 2, no significant sex at birth ($p = .62$) or Māori descent ($p = .22$) differences were observed for the later onset of parenthood. However, the analysis identified three, time-dynamic factors that contributed to the prediction of later onset of parenthood. These included: longer duration of relationship ($p < .0001$); increased

[7] Refer to statistical analysis section 4.11.7 for details.

time spent in full-time employment (p = .01) as well as less time receiving government social benefits (p = .02).

In summary, consistent with the model of childhood and adolescent factors, early onset of parenthood increases with increased exposure to adversity, including increased depression and substance-use problems, lack of qualifications and greater time receiving government social benefits. However, unexpectedly, it was also associated with greater time spent in employment and in a stable relationship with a partner. As expected, the later onset of parenthood also increased with less adversity, relating to greater stability of employment and relationship with a partner.

Table 16
Cox regression model, time-dynamic model of all variables

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
Time-dynamic measures	B(SE)	*P*	HR (95% CI)	B(SE)	*P*	HR (95% CI)
Female	0.73 (0.15)	**<.0001**	2.09 (1.56–2.79)	−0.09 (0.09)	0.34	0.91 (0.76–1.10)
Māori	0.67 (0.15)	**<.0001**	1.96 (1.47–2.62)	−0.11 (0.14)	0.43	0.90 (0.68–1.18)
Duration of relationship	0.16 (0.04)	**.0002**	1.17 (1.08–1.27)	0.14 (0.01)	**<.0001**	1.15 (1.12–1.19)
Full-time employment	0.30 (0.11)	**.01**	1.35 (1.08–1.69)	0.05 (0.06)	0.42	1.05 (0.93–1.18)
Part-time employment	−0.27 (0.13)	**.04**	0.77 (0.59–0.99)	−0.08 (0.06)	0.17	0.92 (0.82–1.04)
Unemployment	0.04 (0.19)	0.81	1.05 (0.73–1.51)	−0.02 (0.17)	0.92	0.98 (0.70–1.37)
Benefit	0.27 (0.17)	0.12	1.31 (0.94–1.83)	−0.22 (0.10)	**.04**	0.81 (0.66–0.99)
Depression	0.37 (0.16)	**.02**	1.45 (1.06–1.97)	0.01 (0.13)	0.91	1.02 (0.78–1.32)
Anxiety	0.02 (0.18)	0.92	1.02 (0.72–1.43)	−0.01 (0.14)	0.97	1.00 (0.76–1.30)
Alcohol problems	0.53 (0.16)	**.001**	1.70 (1.25–2.33)	−0.06 (0.13)	0.66	0.95 (0.74–1.21)
Other substance use problems	0.40 (0.18)	**.03**	1.49 (1.04–2.12)	−0.18 (0.19)	0.34	0.84 (0.58– 1.21)
Highest qualification	−0.47 (0.15)	**.001**	0.62 (0.47–0.83)	0.07 (0.05)	0.13	1.07 (0.98–1.17)
Enrolled full-time	−0.75 (0.23)	**.001**	0.47 (0.30–0.74)	−0.19 (0.16)	0.24	0.83 (0.60–1.13)
Enrolled part-time	−0.04 (0.23)	0.87	0.96 (0.61–1.53)	0.13 (0.12)	0.26	1.14 (0.91–1.44)

Note N = 1055, $\chi^2(28) = 337.71$, $p < .0001$

Table 17
Cox regression model, time-dynamic factors (main effects)

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
Time-dynamic measures	B(SE)	*P*	HR (95% CI)	B(SE)	*P*	HR (95% CI)
Female	0.69 (0.15)	**<.0001**	2.00 (1.50–2.66)	−0.05 (0.09)	0.62	0.96 (0.80–1.14)
Māori	0.73 (0.15)	**<.0001**	2.07 (1.55–2.77)	−0.18 (0.14)	0.22	0.83 (0.62–1.13)
Duration of relationship	0.16 (0.04)	**.0002**	1.17 (1.08–1.27)	0.14 (0.01)	**<.0001**	1.15 (1.12–1.18)
Full-time employment	0.40 (0.10)	**<.0001**	1.50 (1.23–1.82)	0.11 (0.04)	**.01**	1.12 (1.02–1.22)
Benefit	0.36 (0.12)	**.003**	1.44 (1.13–1.84)	−0.21 (0.09)	**.02**	0.81 (0.68–0.97)
Depression	0.36 (0.15)	**.02**	1.42 (1.06–1.92)			
Alcohol problems	0.52 (0.16)	**.001**	1.68 (1.23–2.29)			
Other substance use problems	0.40 (0.18)	**.03**	1.48 (1.04–2.11)			
Highest qualification	−0.49 (0.15)	**.001**	0.61 (0.46–0.82)			
Enrolled Full-time	−0.77 (0.23)	**.001**	0.46 (0.30–0.72)			

Note N = 1055, $\chi^2(15) = 323.91$, $p < .0001$

5.16.3 Fixed Factors and Time-dynamic Models

In the previous two sections, separate models of childhood and adolescent fixed factors and adulthood time-dynamic factors were explored. Both sex at birth and Māori descent differences remained significant in the early onset of parenthood. Therefore, in this final section, models identified in Table 15 and Table 17 were combined to examine how a relative contribution of a range of factors throughout childhood, adolescence and adulthood contribute to the prediction of parenthood.

A nested Cox proportional hazards regression model was fitted using all the childhood and adolescent fixed factors reported in Table 15 and all the adulthood time-dynamic factors reported in Table 17. The results of the fitted model are summarised in Table 18, which shows the fitted model parameters, standard errors, test of significance, hazard ratio and 95% confidence interval for each factor in the model. Table 18 shows the following:

- In Epoch 1, significant sex at birth ($p < .0001$) and Māori descent ($p = .006$) differences remained after the inclusion of all fixed factors and time-dynamic factors, whereby the onset of early parenthood was 2.35 times (95% CI: 1.73–3.30) higher for females than males and for Māori were 1.54 times higher (95% CI: 1.13–2.09) than for non-Māori. The analysis identified nine factors that significantly contributed to the prediction of early parenthood. These included five childhood and adolescent fixed factors: lower average family living standards ($p = .0002$); increased parental use of physical punishment ($p = .02$); lower scholastic performance ($p = .01$); greater deviant peer affiliation ($p = .01$) and early sexual intercourse ($p = .03$). The remaining four factors were time-dynamic factors that included: longer duration of relationship ($p = .003$); increased involvement in full-time employment ($p = .004$); increased problems with alcohol ($p = .001$) and lower likelihood of enrolment in full-time study ($p = .03$).

- In Epoch 2, as anticipated, no significant sex at birth ($p = .76$) or Māori descent ($p = .29$) differences were observed in the later onset of parenthood. As no childhood and adolescent fixed factors were identified as significantly predictive of later onset of parenthood, there were none included in this analysis. However, three time-dynamic factors were identified as significantly predictive of later onset of parenthood. These included: longer duration of relationship ($p < .0001$); increased time spent in full-time employment ($p = .01$) and less time receiving government social benefits ($p = .02$).

The model in Table 18, was refined to a final fitted model of both childhood and adolescent fixed factors and adulthood time-dynamic factors. This led to the removal of two fixed factors and three time-dynamic factors. The refined model is summarised in Table 19, which shows the following:

- In Epoch 1, significant sex at birth ($p < .0001$) and Māori descent ($p = .002$) remained, whereby the onset of early parenthood was 2.33 times (95% CI: 1.74–3.12) higher for females than males and for Māori were 1.69 times (95% CI: 1.24–2.28) higher than for non-Māori. The analysis identified ten factors that significantly contributed to the prediction of parenthood. These included six childhood and adolescent fixed factors: lower family socioeconomic status ($p = .01$); being born into a single parent family ($p = .02$); increased parental use of physical punishment ($p < .001$); lower scholastic performance ($p < .0001$); greater deviant peer affiliation ($p = .004$) and early sexual intercourse ($p = .01$). The remaining four factors were adulthood time-dynamic factors: longer duration of relationship ($p = .002$); longer duration spent in full-time employment ($p = .004$); increased problems with alcohol ($p < .0001$) and less enrolment in full-time study ($p = .01$).

- In Epoch 2, no significant sex at birth ($p = .62$) or Māori descent ($p = .22$) differences were observed in later onset of parenthood. The three time-dynamic factors previously identified continued to significantly predict the later onset of parenthood. As stated previously, these include: longer duration of relationship ($p < .0001$); increased time spent in full-time employment ($p = .01$) and less time receiving government social benefits ($p = .02$).

In summary, consistent with previous models, early onset of parenthood increased with increased levels of exposure to childhood and adolescent family and individual adversity, as well as greater problems with alcohol and less enrolment in education. Early onset of parenthood also increased with increased duration of time spent in a relationship and full-time employment. Furthermore, later onset of parenthood increased with greater financial independence and stability as well as greater duration in relationship time.

Table 18
Combined Cox regression model of fixed factors and time-dynamic factors predicting the onset of parenthood

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
	B(SE)	*p*	HR (95% CI)	B(SE)	*p*	HR (95% CI)
Female	0.86 (0.16)	**<.0001**	2.37 (1.75–3.22)	−0.05 (0.09)	0.60	0.95 (0.80–1.14)
Māori	0.41 (0.16)	**0.01**	1.51 (1.11–2.05)	−0.15 (0.14)	0.28	0.86 (0.66–1.13)
Fixed Factors Model						
Family Socioeconomic Status	−0.11 (0.12)	0.36	0.89 (0.70–1.14)			
Average family living standards	−0.75 (0.19)	**<.0001**	0.47 (0.33–0.69)			
Born into two-parent family	−0.44 (0.21)	**0.03**	0.64 (0.43–0.97)			
Parental use of physical punishment	0.23 (0.10)	**0.01**	1.26 (1.05–1.53)			
Scholastic performance	−0.23 (0.09)	**0.02**	0.80 (0.66–0.96)			
Deviant peer affiliation*	0.07 (0.03)	**0.02**	1.07 (1.01–1.13)			
Early sexual intercourse	0.37 (0.16)	**0.02**	1.45 (1.06–1.99)			
Novelty Seeking*	0.03 (0.02)	0.08	1.03 (1.00–1.06)			
Time-Dynamic Model						
Duration of relationship	0.13 (0.04)	**0.004**	1.14 (1.04–1.24)	0.14 (0.01)	**<.0001**	1.15 (1.12–1.18)
Full-time employment	0.29 (0.10)	**0.005**	1.33 (1.09–1.63)	0.11 (0.04)	**.01**	1.12 (1.02–1.22)

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
Benefit	0.09 (0.13)	0.51	1.09 (0.85–1.41)	−0.21 (0.09)	**.02**	0.81 (0.68–0.97)
Depression	0.17 (0.15)	0.26	1.19 (0.88–1.60)			
Alcohol problems	0.51 (0.16)	**0.001**	1.67 (1.22–2.28)			
Other substance use problems	0.11 (0.19)	0.57	1.12 (0.77–1.63)			
Highest qualification	−0.17 (0.15)	0.26	0.84 (0.62–1.14)			
Enrolled in full-time study	−0.52 (0.23)	**0.02**	0.60 (0.38–0.93)			

Note N = 1055, $\chi^2(23) = 399.98$, $p < .0001$ * HR(95% CI) are all calculated to reflect one standard deviation change in the predictor.

Table 19
Final Cox regression model of fixed factors and time-dynamic factors predicting the onset of parenthood

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
	B(SE)	*p*	HR (95% CI)	B(SE)	*p*	HR (95% CI)
Female	0.85 (0.15)	**<.0001**	2.33 (1.74–3.12)	−0.04 (0.09)	0.62	0.96 (0.80–1.14)
Māori	0.52 (0.16)	**0.001**	1.69 (1.24–2.28)	−0.18 (0.15)	0.22	0.83 (0.62–1.11)
Fixed Factors Model						
Family Socioeconomic Status	−0.27 (0.12)	**0.02**	0.76 (0.61–0.96)			
Born into two-parent family	−0.54 (0.20)	**0.01**	0.58 (0.39–0.87)			
Parental use of physical punishment	0.35 (0.09)	**0.0001**	1.41 (1.18–1.70)			
Scholastic performance	−0.36 (0.08)	**<.0001**	0.70 (0.59–0.82)			
Deviant peer affiliation*	0.08 (0.03)	**0.004**	1.08 (1.02–1.14)			
Early sexual intercourse	0.46 (0.16)	**0.004**	1.58 (1.16–2.15)			
Time-Dynamic Model						
Duration of relationship	0.14 (0.04)	**0.002**	1.15 (1.06–1.25)	0.14 (0.01)	**<.0001**	1.15 (1.12–1.18)
Full-time employment	0.25 (0.09)	**0.004**	1.28 (1.08–1.52)	0.11 (0.04)	**.01**	1.12 (1.03–1.22)
Benefit				−0.21 (0.09)	**.02**	0.81 (0.68–0.97)
Alcohol problems	0.58 (0.15)	**<.0001**	1.78 (1.33–2.39)			
Enrolled in full-time study	−0.60 (0.23)	**0.01**	0.55 (0.35–0.86)			

Note N = 1055 $\chi^2(17) = 379.93$, $p<.0001$* HR(95% CI) are all calculated to reflect one standard deviation change in the predictor

5.17 Māori Culture

5.17.1 Māori Culture Across Epochs

In the final model, when accounting for childhood, adolescent fixed factors and time-dynamic factors, Māori descent remained a significant predictor of parenthood in Epoch 1 (HR (95% CI) = 1.63 (1.20–2.19), p = .002). Therefore, a Māori cultural profile of the Māori cohort was developed, by examining knowledge, engagement/connection, and perception. The Māori cohort was then classified into three groups: Early onset of first parenthood (16–26 years); Delayed onset of first parenthood (27–40 years); and non-parents by 40. For each group, the Table 20 shows the Māori cultural profiles.

The general findings show earlier onset of parenthood had higher proportions of Māori cultural knowledge, engagement, connection, and positive perceptions. That is, earlier onset of first parenthood has significantly higher proportions of parents who reported understanding Māori knowledge. Significant group differences were found for four variables whereby earlier onset of parenthood had higher proportions of parents who understood kawa/protocol or tangi/unveiling, understood what was said in Māori language TV or radio, more were satisfied with their Māori knowledge and had an overall higher score of Māori knowledge. This trend also extended to Māori engagement and connection, whereby earlier onset of parenthood continued to have a significantly higher proportion of parents across six variables including: attending a marae, receiving knowledge from community or sport groups, belonging to a kapa haka group, having attended a tangi or unveiling, listening to Māori radio or TV programmes in either Māori or English. Furthermore, parents who were categorised as earlier onset had higher overall scores of knowledge, engagement and connection, perception, and Māori culture.

5.17.2 Māori Culture Affiliation Model

Māori cultural affiliation was initially measured at ages 21 and 25 years old (see Chapter 3, section 3.5 for description). To explore whether the role Māori cultural affiliation between 21-25 years old contributed to the timing of first parenthood, the final fitted Cox proportional hazards model of childhood and adolescent factors and time-dynamic factors (Table 19) was extended to include the Māori cultural affiliation score between 21 and 25 years, but the final model was restricted to the Māori sample. The results of this model are summarised in Table 21, which shows the fitted model parameters, standard errors, test of significance, hazard ratio and 95% confidence interval for each factor in the model. Table 21 shows the following:

- In Epoch 1, higher reporting of parental punishment, less full-time employment and a higher Māori cultural affiliation score remained significant predictors of parenthood. In Epoch 2, being a male, having less full-time employment, reception of government assistance and lower Māori cultural affiliation scores were significantly associated with delayed onset of parenthood. However, these findings should be interpreted with caution as the sample was restricted to the Māori sample that was measured across the variables (*N*=149).

In summary, a higher Māori cultural affiliation score relating to knowledge, engagement, connection and perception was associated with earlier parenthood; however, an inverse was associated with delayed parenthood.

Table 20
Māori cultural profile of Knowledge, Engagement, Connection and Perception by Onset Epoch and non-parents

Measure	Early Onset N=77	Delayed Onset N=52	Non-Parent N=37	*p*
Knowledge				
a% Iwi known	84.42	80.77	81.08	.84
b% Marae known	46.75	36.54	32.43	.27
c% Can speak a form of Te Reo Māori	93.51	94.23	94.59	.97
d% Understand kawa/protocol of tangi/unveiling	**74.03**	**48.08**	**59.46**	**.01**
e% Understand what is said in Māori language TV or radio	**61.04**	**30.77**	**40.54**	**.002**
f% Satisfied with their knowledge of things Māori	81.82	76.92	56.76	0.14
M(SD) Knowledge Total	**4.42 (1.40)**	**3.67 (1.41)**	**3.65 (1.51)**	**.004**
Engagement & Connection				
a% Attended a marae in the past year	**58.44**	**34.62**	**43.24**	**.024**
b% Attended their marae or local urban marae (past year)	40.26	21.15	20.37	.08
% Received education in Māori culture from the following				
C Their parents	37.66	28.85	35.14	.58
D Their relatives	55.84	36.54	43.24	.09
E A Marae	53.25	50.00	43.24	.61
F At preschool	31.17	26.92	37.84	.55

Measure	Early Onset N=77	Delayed Onset N=52	Non-Parent N=37	*p*
G At primary school	74.03	63.46	70.27	.44
H At secondary school	83.12	75.00	67.57	.16
I At Polytech, university, teachers' college (or similar)	22.08	32.69	29.73	.38
J At work	16.88	19.23	14.81	.56
K As part of a community or sports group	**38.96**	**23.08**	**13.51**	**.01**
L From other sources	29.87	19.23	29.73	.36
M % Are members of a Māori group, organisation or sports team	18.18	17.31	13.51	.82
N % Belonged to a kapa haka group in the past 3 years	18.18	15.38	8.11	.37
O % Ever belonged to a kapa haka group	**55.84**	**32.69**	**27.03**	**.004**
P % Have attended a tangi or unveiling	**80.52**	**51.92**	**67.57**	**.003**
Q % Listen to Māori language radio or TV programmes	**53.25**	**19.23**	**18.92**	**<.0001**
R % Listen to English language Māori radio or TV programmes	**67.53**	**40.38**	**51.35**	**.01**
S % Read English language Māori magazines or articles on Māori issues	49.35	32.69	43.24	.17
Conn A% Met with extended family in the past year	79.22	78.85	62.16	.11
% Met with extended family members at the following events				
B Annual hui	25.97	15.38	13.51	.18
C Kōhanga/kura	10.39	7.69	2.70	.36

Measure	Early Onset N=77	Delayed Onset N=52	Non-Parent N=37	*p*
D Wedding	19.48	23.08	13.51	.53
E Tangi/unveiling	44.16	32.69	21.62	.05
F Sports	23.38	19.23	13.51	.46
G Kapa haka	11.69	7.69	5.41	.51
H Wānanga	9.09	9.62	8.11	.97
I Other	63.64	67.31	56.76	.59
M(SD) Engagement/Connection Total	**11.71 (6.33)**	**9.02 (6.55)**	**8.84 (5.75)**	**.02**
Perception				
A% Positive cultural affiliation	92.27	80.77	91.89	.10
B % Comfortable in Māori social surroundings	98.70	100.00	100.00	.56
C % Comfortable in Pākehā/European social surroundings	100.00	98.08	100.00	.33
% Believed to be treated unfairly based on their ethnicity in the following settings				
E In an educational establishment	1.39	0.00	0.00	.62
F When getting a job	6.94	0.00	3.85	.20
G When getting medical care	1.39	0.00	7.69	.08
H By the Police or in the Courts	9.72	2.33	3.85	.25
I On the street or in a public setting	8.33	4.65	15.38	.30

Measure	Early Onset N=77	Delayed Onset N=52	Non-Parent N=37	*p*
J Other settings	4.17	4.65	3.85	.99
K% Felt emotionally upset as a result of how they were treated on the basis of ethnicity	9.72	6.98	3.85	.61
M% Felt it was important to be recognised as Māori	**64.94**	**34.62**	**45.95**	**.003**
M(SD) Perception Total	**9.71 (1.99)**	**8.77 (2.92)**	**8.03 (3.38)**	**.005**
M(SD) Māori Knowledge, Engagement, Connection and Perception Total	**25.84 (8.10)**	**21.46 (9.57)**	**20.51 (9.15)**	**.003**

Table 21
Final Cox regression model of fixed factors, time-dynamic factors and Māori cultural variables for the Māori cohort

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
	B(SE)	*p*	HR (95% CI)	B(SE)	*p*	HR (95% CI)
Female	0.29 (0.32)	0.36	1.34 (0.72–2.49)	−0.60 (0.30)	**0.04**	0.55 (0.30–0.98)
Fixed Factors Model						
Family Socioeconomic Status	−0.13 (0.30)	0.66	0.88 (0.48–1.59)			
Born into two-parent family	0.30 (0.38)	0.43	1.35 (0.64–2.86)			
Parental use of physical punishment	0.34 (0.16)	**0.04**	1.40 (1.02–1.93)			
Scholastic performance	0.32 (0.21)	0.14	1.37 (0.91–2.08)			
Deviant peer affiliation*	0.02 (0.06)	0.79	1.00 (0.77–1.39)			
Early sexual intercourse	0.00 (0.32)	0.99	1.00 (0.54–1.85)			
Time-Dynamic Model						
Duration of relationship	−0.11 (0.12)	0.34	0.89 (0.71–1.12)	0.01 (0.04)	0.78	1.01 (0.93–1.10)
Full-time employment	−0.74 (0.15)	**<.0001**	0.48 (0.36–0.64)	−0.42 (0.12)	**.0002**	0.65 (0.52–0.82)
Benefit				−1.04 (0.35)	**.003**	0.35 (0.18–0.71)
Alcohol problems	−0.16 (0.32)	0.61	0.85 (0.45–1.59)			
Enrolled in full-time study	−0.37 (0.49)	0.45	0.69 (0.26–1.81)			
Māori Culture						
Total Māori cultural score	0.05 (0.02)	**0.003**	1.05 (1.02–1.09)	−0.04 (0.02)	**0.02**	0.96 (0.93–0.99)

Note N = 149, $\chi^2(17) = 225.07$, $p < .0001$ * HR(95% CI) are all calculated to reflect one standard deviation change in the predictor.

Table 22
Combined Cox regression model of fixed factors, Time-dynamic factors and Māori cultural variables

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
	B(SE)	*p*	HR (95% CI)	B(SE)	*p*	HR (95% CI)
Female	0.36 (0.32)	0.26	1.44 (0.77–2.70)	−0.49 (0.27)	0.06	0.61 (0.36–1.03)
Fixed Factors Model						
Family Socioeconomic Status	−0.07 (0.31)	0.82	0.93 (0.51–1.70)			
Born into two-parent family	0.51 (0.39)	0.19	1.66 (0.78–3.56)			
Parental use of physical punishment	0.42 (0.16)	**0.01**	1.52 (1.11–2.08)			
Scholastic performance	0.44 (0.21)	**0.04**	1.55 (1.03–2.33)			
Deviant peer affiliation*	0.04 (0.06)	0.49	1.04 (0.93–1.17)			
Early sexual intercourse	−0.01 (0.32)	0.97	0.99 (0.53–1.85)			
Time-Dynamic Model						
Duration of relationship	−0.07 (0.11)	0.52	0.93 (0.74–1.16)	0.02 (0.04)	0.55	1.02 (0.95–1.10)
Full-time employment	−0.73 (0.15)	**<.0001**	0.48 (0.36–0.65)	−0.27 (0.09)	**0.002**	0.77 (0.65–0.91)
Benefit				−0.83 (0.32)	**.01**	0.44 (0.23–0.82)
Alcohol problems	−0.09 (0.32)	0.78	0.91 (0.48–1.72)			
Enrolled in full-time study	−0.43 (0.50)	0.38	0.65 (0.24–1.72)			
Māori Culture						
Total Māori cultural score	0.06 (0.02)	**0.001**	1.06 (1.03–1.10)			

Note N = 163 $\chi^2(16) = 231.54$, $p<.0001$ * HR(95% CI) are all calculated to reflect one standard deviation change in the predictor.

5.18 Summary of Study 1 Findings

The present study utilised the CHDS longitudinal data to examine the factors associated with the onset of parenthood between the ages of 16 and 40 years and identify any variations as a function of sex at birth or Māori descent. The key findings will be outlined below and the implications of these findings in relation to existing research will be discussed later in the general discussion (see Chapter 6).

Firstly, in the present study, as hypothesised sex at birth and Māori descent differences in the onset of parenthood were evident. When comparing females with males, females had significantly ($p < .05$) higher rates of earlier parenthood than males. Similarly, when comparing Māori to non-Māori, Māori also had higher rates of earlier parenthood than non-Māori.

Early onset of parenthood was significantly ($p < .05$) associated with a range of potentially confounding childhood and adolescent factors at the bivariate level. Earlier onset of parenthood was associated with lower quality socio-demographic backgrounds, disruptive family structure, family dysfunction, greater childhood abuse exposure, disruptive childhood behaviour, lower school achievement and delinquent or aversive adolescent factors and individual traits (Boden et al., 2008; Gibb et al., 2014; Marie et al., 2011; Mills et al., 2011; Morgan et al., 1995; Pears et al., 2005; Ravanera & Fernando, 2004; Van der Klis et al., 2002; Wellings et al., 1999). When controlling for confounding factors, significant sex, and Māori descent differences in the earlier onset of parenthood remained. However, after controlling for additional time-dynamic variables, the sex and Māori descent differences were no longer statistically significant.

The results indicate that earlier onset of parenthood is associated with greater adversity during childhood and adolescence, relationship and employment stability, substance problems and less time spent enrolled in full-time study. In contrast, delayed parenthood was

not associated with any childhood or adolescent confounding factors. Instead, delayed onset of parenthood was best explained by relationship, employment, and economic stability (Astone & Peters, 2014; Kravdal, 1994; Pears et al., 2005; Ravanera & Fernando, 2004; Schmied et al., 2013). The findings of adverse childhood and adolescent factors being significantly associated with earlier onset of parenthood were consistent with the hypotheses, however, the findings of positive tie dynamic factors as significant predictors relating to relationship and employment were unexpected. Likewise, the findings for delayed onset of parenthood were consistent with the hypothesis, identifying later life events as being associated with delays in parenthood.

Chapter 6 will discuss the implication of these findings in the context of the wider literature.

Chapter 5: Study 2, The Onset of Parenthood and Life Course Outcomes

6.1 Onset of parenthood and differential life course outcomes

Based on the previous chapter it is clear that parents with an earlier onset of parenthood are descriptively different from those who delay. Younger parents tend to have more adverse upbringings, whereas those who delay parenthood tend to be more economically stable and better prepared to have children. However, as described in Chapter 1, how parenthood is viewed in society for these two types of parents is starkly different. For younger parents, an earlier onset of parenthood is perceived as a disruptor that will result in continued disadvantage and hardship for both the parent and child (Astone & Peters, 2014; Cribb, 2009; Dariotis et al., 2011; Waetford, 2008; Whitley & Kirmayer, 2008; Wilson & Huntington, 2006). For older parents, delayed onset of parenthood is perceived positively because they are more likely to have completed life course milestones relating to education, employment and partner formation and thus experience better life course outcomes (Card & Wise, 1978; Hofferth, 1984; Kravdal, 1994; Nisén et al., 2019).

Most of the literature on earlier onset of parenthood examines outcomes during early to mid-twenties and implies that younger parents experience disadvantage due to the timing of parenthood. However, due to mixed findings, it has been argued that earlier onset of parenthood itself does not substantially increase the level of disadvantage beyond what already exists (Lee & Gramotnev, 2006; Zeck et al., 2007). Instead, it is the accumulative effects of early life course disadvantage that results in adverse outcomes. Likewise, the advantageous outcomes of older parents are not necessarily a direct reflection of delaying parenthood per say but rather having the opportunity to develop careers, accumulate wealth and be selective with partners (Hofferth, 1984; Nisén et al., 2019). To examine these questions the current study examines the differences in the onset of parenthood and life

course outcomes spanning the following five domains: family resources, education, household composition, psychosocial well-being, and mental health.

6.2 Differences in Outcomes between Mothers and Fathers

As outlined in the literature review in this dissertation, studies examining gender differences in outcomes is relatively scarce, as mothers are often the primary focus of research. However, in some domains of life there is evidence to suggest that men and women may differ in outcomes. One primary area of reported differences is within socioeconomic outcomes, whereby women are often more disadvantaged than men. It has been suggested that differences in socioeconomic outcomes may be due to gender differences in domestic work and childcare (Assini-Maytin & Green, 2015; Gibbs et al., 2014; Robinson, 1988; Williams et al., 1997). Gender differences have also been observed in educational qualifications, as young mothers are less likely to continue on with higher education and, in general, mothers have overall lower levels of education than fathers (Assini-Meytin & Green, 2015; Card & Wise, 1978). However, the roles of childcare, educational attainment and economic success are all interrelated and should be taken into consideration, particularly as the onset of parenthood is typically a more disruptive period for women[8] than for men. The role of gender in relation to other life outcomes is under-researched and requires further exploration.

6.3 Differences in Outcomes between Māori and non-Māori

Due to the higher rates of earlier parenthood among indigenous populations there is a limited body of research examining ethnic differences in the onset of parenthood (Marie et al., 2011; Rarere, 2018). However, this research has largely focused on health outcomes, and therefore research on socio-economic and psychosocial outcomes is scarce (Craig, Mantell, Ekeroma, Stewart, & Mitchell, 2004; Craig, Mitchell, Stewart, Mantell, & Ekeroma, 2004;

[8] Due to pregnancy, childbirth, recovering and early rearing of children

Ekeroma, Craig, Stewart, Mantell, & Mitchell, 2004; Mantell et al., 2004). As a result, little is known about the relationship between the onset of parenthood and life course outcomes regarding ethnic differences. Importantly, in the New Zealand context, little is known about the contribution of culture and cultural affiliation to adult life course outcomes following parenthood for Māori.

6.4 Life Course Outcomes at 40 Years of Age

In Chapter 4, two groups of parents were identified (early onset: 16–26 years and delayed onset: 27–40 years of age) who varied in terms of childhood and adolescent risk factors associated with the timing of parenthood. Earlier onset of parenthood was associated with greater experiences of family socio-economic adversity, single-parent households, greater exposure to physical punishment, lower school performance and deviant risky behaviour during adolescence. No childhood and adolescent factors were associated with delayed onset of parenthood. After controlling for all of the significant factors, the gender and ethnic differences remained significant for the earlier onset of parenthood, with rates being higher amongst women and Māori; however, no significant gender or ethnic differences remained for delayed onset of parenthood.

This study now extends the analyses reported in Chapter 4 to examine the associations between onset of parenthood and longer term adult functional outcomes at age 40. The specific aims were:

1. To investigate the associations between the onset of parenthood and adult functional outcomes;
2. To examine the extent of differences in these associations by gender and between Māori and non-Māori;

3. To examine the extent to which these associations are explained by prior childhood/adolescent characteristics known to be associated with early transition to parenthood;
4. To explore potential mediating pathways that may explain any residual associations between the transition to parenthood and later outcomes after adjustment for prior childhood and adolescent factors;
5. To explore the role of cultural affiliation within the Māori cohort, as both an explanatory factor and an outcome.

6.5 Methods

6.6 Measures

6.6.1 Characteristics of the Sample

The analysis for this Chapter is based on a sample of 693 participants (371 females, 322 males) for whom information was available on the onset of parenthood and parenting up to age 40, as well as observed outcomes at age 40 years. The sample represented 54.78% of the initial birth cohort of 1,265 participants and 65.69% of the sample of 1055 participants who had become parents by age 40 in study 1. In addition, data were missing on some of the covariates used in the analysis of risk factors/predictors due to variations in the timing and nature of the assessments. These variations in sample sizes are noted in the tables. To examine the possible impact of missing data and sample attrition on the representativeness of the analysis sample, the 693 participants included in the parenting outcome analysis were compared with the remaining 362 participants who had become parents by age 40 but who were not included in the analysis. The two groups of participants were compared on a series of measures of family background and individual characteristics known to be associated with the onset of parenthood and/or outcomes at age 40. Appendix Table A2 shows the associations between the selected measures and the likelihood of inclusion in the parenting

outcome analysis. There was a statistically significant ($p < .01$) association between sample inclusion and gender, with female parents seemingly having a lower rate of sample attrition: this largely reflects the fact that the outcome analysis was limited to those actively engaged in parenting, and male parents were less likely to be so engaged. There was also a significant ($p < .01$) association with educational attainment at age 21, reflecting a modest bias towards under-representation of those lacking formal educational qualifications in the outcome analysis. However, sample attrition was otherwise unrelated to ethnicity, or any other measure in the table.

6.6.1.1 Parenthood Study 2

For this study, the onset of parenthood was classified as the earliest age at which the participant reported giving birth or fathering a biological child and was involved as a parent either full-time or part-time. In this study a total of 693 parents reported becoming parents by the age of 40 and being actively involved with their child. Onset of parenthood was classified either as earlier onset, <27 years old (29.87%), or delayed onset, 27+ years old (70.13%). This definition varies slightly from the previous chapter, as the focus of this chapter is on outcomes associated with parents who were involved in parenting. Therefore, parents who were not involved with their children and participants who did not transition to parenthood by age 40 have been removed from any analyses.

6.6.1.2 Ethnicity

A total of 111 (16.02%) parents identified as being Māori or of Māori descent and the remaining 582 (83.98%) parents were identified as non-Māori (see section 3.3.3 for description of ethnicity).

6.6.2 Adult Functioning Outcomes

To examine the extent to which the onset of parenthood was associated with adult functioning outcomes at age 40, a series of outcomes related to socio-economic well-being,

education, household composition, psychosocial well-being and mental health were selected for inclusion in this analysis. These outcomes were identified on the basis of previous research and the details of each measure used in the current analyses are described below.

6.6.2.1 Socio-economic Well-being

Home ownership: The participants were questioned about the type of housing they currently lived in and were asked to indicate if they lived in a house, flat, apartment or other, and were asked if they owned that dwelling. Responses were coded based on ownership whereby 0 = *no ownership* or 1 = *homeownership.* Of the sample, 70.56% (N =489) were classified as homeowners.

Socio-economic status: The socio-economic status of cohort members was assessed at age 40 using the New Zealand Socioeconomic Index (NZSEI) 2006 classification of occupations (Milne, Byun, & Lee, 2013). This index classifies occupations on a scale ranging from 10 to 90 with higher scores implying higher occupational status. The classification of occupational status was derived from the participant report of their current or most recent occupation. The scores ranged from 10 to 90 with a mean (SD) of 50.33 (16.84).

Gross family income (NZD, 000): At the age-40 assessment the participants were questioned about their gross income over the previous 12 months from all sources and (if applicable) that of their partner. From this information, estimates of total gross family income were obtained. Incomes reported in currencies other than New Zealand dollars were converted into New Zealand dollars using Purchasing Power Parties (Organisation for Economic Co-operation and Development (OECD), 2007, 2012). Incomes were divided by 1000 for ease of interpretation of coefficients. For the sample, the gross family income ranged from 2.50 to 340.00 ($, 000) with a mean (SD) 128.52 (70.91) ($, 000).

Material well-being: The participants' material well-being was assessed using the 24-item Material Wellbeing Index (MWI; Perry, 2016). The MWI items were divided into five

subcategories. Eight items related to ownership or participation where participants responded on a two-point scale: 0 = *I don't have/I don't do* or 1 = *I have/I do*. An example of this is "*Do you have suitable clothes for important or special occasions?*" Nine items related to economising where participants responded on a three-point scale ranging from 0 = *a lot* to 2 = *not at all.* An example of this is: *"Do you buy cheaper cuts of meat or bought less meat than you would like?"* Two items related to housing problems where participants responded on a three-point scale ranging from 0 = *major problem* to 2 = *no problem.* An example of this is "*Do you have problems with dampness or mould in your present accommodation?*". Two items were related to financial strain where participants responded on a three-point scale ranging from: 0 = *more than once* to 2 = *not at all.* An example of these items are "*in the past 12 months, due to a shortage of money you could not pay electricity, gas, rates or water bills on time*". Three items related to freedoms/restrictions where participants responded differently on each item. For the item, "*when buying or thinking about buying, clothes or shoes for yourself, how much do you usually feel limited by the money available?*" The participants responded on a four-point scale ranging from: 0 = *very limited* to 3 = *Not at all limited.* For the item *"Imagine that you have come across an item in a shop or on the internet that you would really like to have. It has a price tag of $300. It is not an essential item. If this happened, how limited would you feel about buying it?*" The participants responded on a five-point scale ranging from 0 = *could not buy* to 4 = *not at all limited*. For the final item "*If you had an unexpected and unavoidable expense of $5000 in the next week, could you pay it within a month without borrowing?"* the participants could respond on a two-point scale: 0 = *no* or 2 = *yes*. The scores were calculated by summing the items; higher scores indicate higher material well-being. This scale had a high internal consistency (α = .88) with scores ranging from 0 to 35 with a mean (SD) of 28.61 (6.91) and a median of 31.00.

6.6.2.2 Education

Higher educational attainment: At each interview from ages 18 to 40 the participants were asked whether they had obtained any educational or vocational qualifications since the previous assessment. Participants were able to respond either yes or no for a range of high school, tertiary or vocational qualifications. Based on the participant's highest attained qualification by the age of 40 they were coded as 0 = *No higher qualifications* or 1 = *higher qualification attained* (43.50%). Higher qualifications were classified as being any qualification of NCEA level 5 (Certificate or Diploma) or above.

6.6.2.3 Household Composition

Long-term relationship. The participants were asked to indicate whether they were currently involved in a relationship with an intimate partner and were questioned about the duration they had been with their partner. Long-term relationship was defined by the legal de facto relationship period in New Zealand, which is being in a relationship for three years or more. Based on these responses, the participants were coded as 0 = *No long-term relationship* or 1 = *in a long-term relationship*. Based on this sample, 80.09% (N = 555) reported being in a long-term relationship.

Household crowding. The participants were asked to report the number of occupants who lived in their residence and were questioned about the total number of rooms in their residence. The crowding index was calculated based on the American Crowding Index (Goodyear et al., 2012) as the total number of occupants divided by the total number of rooms. Rooms were defined as kitchen, dining and living rooms, and bedrooms but excluded bathrooms and toilets. The scores ranged from 0.13 to 3.00 persons per room with a mean (SD) of 0.67 (0.25) and a median of 0.63.

6.6.2.4 Psychosocial Well-being

Social support: At age 40, the participants' social support was measured using a 37-item scale based on published instruments about the availability of material support, emotional support, companionship, and mentoring advice (see Magdol et al., 1998 for details). An example of these items was "*if you were sick in bed for several weeks, [how many people] would help you?*" The participants responded on a three-point scale ranging from 0 = *none* to 3 = *six plus.* The items were summed together, with higher scores reflecting greater social support. This scale had a high internal consistency (α =.94) with scores ranging from 9 to 69 with a mean (SD) of 50.30 (8.80) and a median of 51.00.

Self-esteem: At age 40, the participants' self-esteem was assessed using the 10-item Rosenberg Self-Esteem Scale (RSES: Rosenberg, 1965). The items were scored on a 4-point scale, 1 = *strongly agree* to 4 = *strongly disagree.* An example item is "*At times, I think I am no good at all*". Five of the items were reverse coded. An example item is "*On the whole, I am satisfied with myself*". The scores were calculated by summing the items, higher scores indicated higher self-esteem. This scale had high internal consistency (α = 0.91) with scores ranging from 10 to 40 with a mean of 32.81 (SD = 4.57) and a median of 32.00.

Life satisfaction: At age 40 years, information about life satisfaction was collected using a custom-written questionnaire for the CHDS that required cohort members to rate their current satisfaction with 13 areas of their life: work; leisure time; partner relationships; relationships with people of the same sex; relationships with people of the opposite sex; social life; money; independence; daily interactions with others; the future; and life as a whole. The participants rated their satisfaction in each domain on a 4-point scale from 1 = *very happy* to 4 = *very unhappy*. Confirmatory factor analysis showed that the items could be scaled as a unidimensional scale reflecting overall life satisfaction (Fergusson et al., 2015). The total scores were calculated by reverse scoring and summing all of the items so

that higher scores implied higher life satisfaction. The participants scores ranged from 28 to 52 with an overall mean of 43.59 (SD = 5.28) and a median of 43.00. This scale had a high internal consistency (α = .91).

6.6.2.5 Mental Health

Total number of mental health disorders: At age 40, components of the Composite International Diagnostic Interview (CIDI; World Health Organization, 1993) were used to assess DSM-IV symptom criteria for major depression (MD), anxiety disorders (including generalised anxiety disorder, specific phobia, social phobia, agoraphobia and panic disorders), and substance dependence (including alcohol, cannabis, and other illicit drugs), all of which have previously been described in Study 1, with detailed descriptions in the appendix B. For the purposes of the present analysis, participants were classified as having MD or any anxiety disorder if they met DSM-IV diagnostic criteria at any time during the previous 12 months. Participants were classified as having substance dependence if they met DSM-IV criteria for alcohol, cannabis, or other illicit drug dependence during the interval. In the CIDI, suicidal behaviour is assessed by asking participants whether they had ever thought about killing themselves or had attempted suicide during the previous 12 months and the frequency of such thoughts or attempts. Those individuals who reported having any suicidal thoughts, or who reported having attempted suicide at least once in the previous 12 months, were classified as having suicidal ideation. The above measures were combined to provide an overall measure of the severity of mental health problems in the previous 12 months. The number of mental disorders ranged from zero to five with 75.90% of the parents reporting no mental disorders at age 40.

6.6.3 Childhood and Adolescent Covariates

Each of the childhood and adolescent variables that were included in Study 1 in Chapter 4, were also included in the current study. These variables were included to examine

the extent to which outcomes were influenced by childhood and adolescent factors that were associated with parenthood. The details of each measure used in the current analyses are described in the general methods in Chapter 3 (see section 3.4).

6.6.4 Mediating Pathway Factors

Using data gathered at the age 30- and 35-year interviews a series of measures were used to explore potential mediating pathways between the two onset of parenthood groups and adult functioning outcomes at age 40. The mediating processes reflect changes in the life course during adulthood. The following measures were included in the analysis on the basis that they met the minimum Baron and Kenny (1986) criteria for mediation (see section 5.7.5) and spanned theoretically relevant domains.

6.6.4.1 Employment and Socio-economic Well-being

Employment in the workforce: At age 30 and 35, participants were questioned about how many months they worked in full-time employment since the previous assessment, where full-time was defined as working in paid employment for 30+ hours per week. These variables were summed to obtain a measure of the total time spent in employment, which ranged from 0 to 120 months, with a mean (SD) of 85.16 months (40.83).

Occupational choice: As described previously, the socio-economic status of cohort members was assessed at age 35 using the NZSEI 2006 classification of occupations (Milne, Byun, & Lee, 2013). For details please refer to previous description. Based on the participants' responses they were categorised into six sub-group levels of NZSEI ranging from 1 = *Lower occupational choice* (7.11%) to 6 = *Higher occupational choice* (20.27%).

Accumulated net assets (NZD, 000): At the 30- and 35-year interviews the participants were questioned about whether they had any savings or investments. Savings/investments included money in: savings or trading banks; superannuation schemes; stocks, shares or debentures; rental properties or other real estate; secured loans; investment or finance

companies; building societies or friendly societies; accounts held by lawyers or accountants; or any other investments. Those who had investments were asked for the total realisable value of their investments. Investments reported in currencies other than New Zealand dollars were converted into New Zealand dollars using Purchasing Power Parties (OECD, 2007, 2012). The accumulated net assets at 30 and 35 years old were combined and averaged across the two assessments. The sample mean (SD) accumulated net assets for those aged 30 to 35 years were 76.87 (120.13) ($, 000).

6.6.4.2 Partner Relationships

Partner antisocial behaviour: At the age 30 and 35 year interview the participants who reported being involved in a romantic relationship were assessed using nine questions about the extent to which their partner or spouse was involved in delinquency and substance-using behaviours. Examples of scale items included aggressive behaviour (e.g. fighting), tobacco, alcohol and cannabis use, illegal behaviour and getting into trouble with the law. All items were rated on a three-point scale ranging from 0 = *doesn't apply* to 2 = *definitely applies.* One item was reverse scored, then all items were summed to create an overall score, whereby higher scores indicated greater partner delinquency and substance-use behaviour. For the purposes of this study, participants who did not report having a partner were scored zero to reflect no partner violence. Furthermore, the age 30 and 35 antisocial behaviour scores were combined to create an average partner antisocial behaviour score over these periods. For this study, the internal consistency at age 30 and 35 were poor ($\alpha = 0.62$ and $\alpha = 0.58$ respectively), which may be due to the low base rate of delinquent behaviours at those ages. The overall averaged partner antisocial behaviour ranged from 0 to 12 with a mean (SD) of 1.36 (1.79) and a median of 1.00.

Total number of partners: At the age 30 and 35-year interviews, the participants were asked to indicate how many times they had been involved in a relationship with an intimate

partner during the five years since the previous assessment. Their responses were summed over the ten-year interview periods to provide a total number of cohabiting partners between 25 and 35 years of age. This ranged from 0 to 12 with a mean (SD) of 2.09 (1.45).

6.6.4.3 Social Support, Mental Health and Well-being

Social support: At the 30- and 35-year interviews, social support was measured using a 37-item scale about the availability of material support, emotional support, companionship, and mentoring advice (Magdol et al.,1998). See section 5.6.2.4 for a description of social support. The items for each interview age were summed together and then averaged over the two interview periods, whereby higher scores reflected greater social support. This scale had a high internal consistency at both the 30- and 35-year interviews ($\alpha = .90$ at both interview ages). The averaged social support for 30 to 35 ranged from 9.5 to 67.5 with a mean (SD) of 51.26 (7.32) and a median of 51.50.

Any mental health disorders: At age 30 and 35 years, components of the CIDI (World Health Organization, 1993) were used to assess DSM-IV symptom criteria for major depression (MD), anxiety disorders (including generalised anxiety disorder, specific phobia, social phobia, agoraphobia and panic disorders), and substance dependence (including alcohol, cannabis, and other illicit drugs) and suicidal behaviour. Based on the previous descriptions of these mental health disorders (see Appendix B). Those who met criteria for mental disorders or reported suicidal ideation or substance-use dependence at any time in the period from age 25 to 35 were classified as having a mental health problem (44.97%).

Educational attainment by 25: To control for prior educational disadvantage earlier in life, an educational attainment by age 25 was included as an additional fixed factor. At the 18-, 21- and 25-year assessments, participants reported any qualifications they attained since the previous assessment. The participants were classified according to their highest reported qualification by age 25 on a five-point scale reflecting their highest level of academic

attainment by age 25. This scale consisted of 0 = *No qualifications* (7.97%); 1 = *NCEA level 4 or below (57.50%)*; *2 = NCEA level 5 certificate or Diploma (9.16%);* 3 = *Bachelor's degree (23.90%);* 4 = *completed a postgraduate qualification (1.46%).*

6.6.5 Māori Cultural Affiliation

Any participant who identified their ethnicity as Māori or being of Māori descent during the 21-, 25- and 40-year interviews were asked a range of questions relating to Māori culture. These were used to create the following two Māori cultural score variables. Refer to the Māori cultural affiliation description in the general methods for details (see section 3.5) on Māori cultural affiliation at 12–25 years old and at age 40.

6.7 Statistical Methods

6.7.1 Bivariate Associations of Parenthood and Adult Outcomes

Bivariate analyses was used to examine means and percentages for all adult functioning outcomes, comparing early and delayed onset of parenthood. To test for significance between group differences, chi-square tests were conducted for percentages and *t* tests were conducted to compare mean group differences. To illustrate the effect size of the between-group difference in outcomes, Cohen's d was calculated using the following formula:

$$d = (M_1 - M_0) / \text{Sample } SD_{pooled} \qquad (A)$$

where M_1 was the group mean or rate for those who had delayed onset of parenthood and M_0 was the group mean or rate for those who had an earlier onset of parenthood. SD_{pooled} was the pooled standard deviation of the outcome in the sample.

6.7.2 Parenthood and Adult Functional Outcomes

6.7.2.1 Parenthood and Adult Functional Outcomes by Gender

To explore the extent to which the associations between the adult functioning outcomes at age 40 and the onset of parenthood varied with sex at birth, a series of regression

models were fitted whereby each outcome was modelled as a linear function of the onset of parenthood, sex and onset of parenthood by sex interaction. For continuous outcomes, a linear regression model was fitted of the form:

$$Y_i = B0 + B1P_i + B2S_i + B3P_ixS_i \qquad (B1)$$

where Y_i was the adult functioning outcome Y for individual *i*. For dichotomous outcomes, a logistic regression model was fitted of the form:

$$\text{logit}(\Pr(Y_i = 1)) = B0 + B1P_i + B2S_i + B3P_ixS_i \qquad (B2)$$

where logit(Pr(Y_i=1)) was the log odds of the probability (Pr) of the outcome Y for individual *i*. In both of these fitted regression models, P_i and S_i are dichotomous variables (0,1) representing the onset of parenthood group (delayed onset = 1) for an individual and the individual's sex at birth (female = 1) respectively; the coefficients B1 represented the effect of the onset of delayed parenthood on the outcome; B2 represented the effect of sex on the outcome; and B3 represented the interaction effect between the onset of parenthood and sex on the outcome.

6.7.2.2 Parenthood and Adult Functional Outcomes by Ethnicity

To explore the extent to which the associations between the adult functioning outcomes at age 40 and the onset of parenthood varied between Māori and non-Māori a series of regression models were fitted, whereby each outcome was modelled as a linear function of onset of parenthood, Māori descent, and onset of parenthood by Māori descent interaction. For continuous outcomes, the linear regression model was fitted in the form:

$$Y_i = B0 + B1P_i + B2M_i + B3P_ixM_i \qquad (C1)$$

where Y_i was the adult functioning outcome Y for individual *i*. For dichotomous outcomes, the model was adjusted as a logistic regression fitted to the form:

$$\text{logit}(\Pr(Y_i = 1)) = B0 + B1P_i + B2M_i + B3P_ixM_i \qquad (C2)$$

where logit(Pr(Y_i = 1)) was the log odds of probability (Pr) of the outcome Y for individual *i*. In both of these fitted regression models, P_i and M_i are dichotomous variables (0,1) representing the onset of parenthood group (delayed onset = 1) for an individual and whether the individual were of Māori descent (Māori = 1) respectively; the coefficients B1 represented the effect of delayed onset parenthood on the outcome; B2 represented the effect of ethnicity on the outcome; and B3 represented the interaction effect between the onset of parenthood and Māori descent on the outcome.

6.7.3 Adjustment for Childhood and Adolescent Covariate Factors

To adjust the associations between the onset groups of parents and the adult functioning outcomes for childhood and adolescent confounding factors, a series of generalised linear regression models were fitted to the data in which each outcome was individually examined as a function of the onset of parenthood, sex at birth, Māori descent and a series of childhood and adolescent covariate factors. For continuous outcomes, the model was of the form:

$$Y_i = B0 + B1P_i + B2S_i + B3M_i + \sum B_k Z_{ik} \qquad (D1)$$

For dichotomous outcomes, it was of the form:

$$\text{logit}(\Pr(Y_i=1)) = B0 + B1P_i + B2S_i + B3M_i + \sum B_k Z_{ik} \qquad (D2)$$

where Z_{ik} were a set of covariate factors for individual *i*, and the interpretations of all other variables are similar to those in the original models. In these extended models, the coefficients B1 represented the effect of delayed parenthood on the adult functioning outcome net of the effects of the covariate factors. Initially all covariates were included and then the model was gradually refined to include covariates that were significant ($p < .05$) predictors of the outcomes or had a substantial impact on the B1 coefficient. To illustrate the size of the between-group difference in outcomes adjusted for covariates, estimates of the marginal rates or means of each outcome in each parenthood group were calculated from the

fitted regression models (Graubard & Korn, 1999). Similarly, adjusted effect size estimates, represented as adjusted Cohen's d, were calculated with the following formula where $\dot{M}_1$ and $\dot{M}_0$ were the adjusted marginal rates or means of the outcomes in the models for delayed and early onset parent groups respectively.

$$d = (\dot{M}_1 - \dot{M}_0) / \text{Sample } SD_{pooled} \qquad (E)$$

6.7.4 Correlations

Spearman correlations were calculated for potential mediating variables with the onset of parenthood and the adult outcomes that had residual unexplained significant differences when controlling for prior childhood and adolescent covariates.

6.7.5 Adjustment for Mediating Factors

The regression models for outcomes with unexplained residual differences were extended to include a series of mediating variables for the aforementioned adult outcomes to explore the extent to which mediating factors explained the residual associations between the onset of parenthood and outcomes after controlling for childhood and adolescent covariates. As previously stated, mediating factors were selected to be included in the analyses if they met the minimum Baron and Kenny (1986) criteria for mediation (see section 5.12) and spanned theoretically relevant domains. For continuous outcomes, the extended model was of the form:

$$Y_i = B0 + B1P_i + B2S_i + B3M_i + \sum B_k Z_{ik} + \sum B_v Z_{iv} \qquad (F1)$$

For dichotomous outcomes, it was of the form:

$$\text{logit}(\Pr(Y_i=1)) = B0 + B1P_i + B2S_i + B3M_i + \sum B_k Z_{ik} + \sum B_v Z_{iv} \qquad (F2)$$

where Z_{iv} were a set of mediating variables for individual *i*, and the interpretations of all other variables are similar to those in the original models. In these extended models, the coefficients B1 represented the effect of the onset of parenthood on the adult functioning outcomes net of the effects of the childhood and adolescent covariate factors and mediating

factors. Marginal rates and means, as well as Cohen's d, were also calculated in the same way as previously mentioned.

6.7.6 Moderation

Finally, to test for moderation effects of gender and ethnicity on the role of the mediating variables, the previous models were further extended to include the following interactions: (a) a sex by mediator factor interaction term and (b) a Māori descent by mediator factor interaction term.

6.7.7 Māori Cultural Affiliation

To explore the role of cultural affiliation, additional analyses were conducted within the Māori sample of parents to examine the possible role of Māori cultural affiliation and engagement in explaining the difference between early and delayed parenthood for each of the outcomes in this study.

6.7.7.1 Bivariate Associations of Māori Culture Affiliation Between 21 and 25 Years with Adulthood Outcomes

Spearman correlations were calculated for the overall Māori cultural affiliation between those aged 21 to 25 years and for each of the adult outcomes relating to socio-economic well-being, education, household composition psychosocial, and mental health.

6.7.7.2 Multivariable Modelling Extended for Overall Māori Cultural Affiliation at 21–25 years

Within the Māori sample, a series of generalised regression models were fitted to the data, in which each outcome was individually examined as a function of the onset of parenthood, sex at birth, a series of childhood and adolescent factors and Māori cultural affiliation between 21 and 25 years. For continuous variables, a linear regression model was fitted of the form:

$$Y_i = B0 + B1P_i + B2S_i + \sum B_k Z_{ik} + B3C_i \qquad (G1)$$

For dichotomous outcomes, it was of the form:

$$\text{logit}(\Pr(Y_i=1)) = B0 + B1P_i + B2S_i + \sum B_k Z_{ik} + B3C_i \qquad (G2)$$

where B3 represented the effect of Māori cultural affiliation C for individual i on the outcome. In these extended modes B1 represented the effect of the onset of parenthood on adulthood functioning outcomes net of the effects of childhood and adolescent covariate factors, and overall Māori cultural score for those aged 21-25 years. The interpretation of all other variables was similar to those in the original models.

6.7.8 Māori Culture at 40 Years of Age

To explore the relationship between the onset of parenthood and overall Māori cultural scores at age 40, a linear regression model was fitted in the form:

$$Y_i = B0 + B1P_i \qquad (H)$$

where Y_i was the Māori cultural score at age 40 for individual *i.* The coefficient B1 represented the difference in early and delayed Māori parents on Māori cultural affiliation at age 40.

This model was extended to control for Māori cultural affiliation between 21 and 25 years and was fitted in the form:

$$Y_i = B0 + B1P_i + B2C_i \qquad (I)$$

where B2 represented the effect of Māori culture at 21–25 years of age on the Māori outcome and B1 represented the effect of the onset of parenthood on adulthood cultural affiliation at age 40, net of the effect of prior history of Māori cultural affiliation. Marginal adjusted means were calculated as previously. The strength of the association was reported using Cohen's d.

6.8 Results

6.9 Bivariate associations between onset of parenthood and adult functional outcomes

Table 23 shows the association between the onset of parenthood and a series of functional outcomes assessed at age 40. These outcomes include measures of socio-economic well-being (home ownership, socio-economic status, family income and deprivation); household composition (long-term relationship and household crowding); higher education (tertiary qualification); psychosocial adjustment and mental health (social support, self-esteem and life satisfaction and total number of mental health disorders). The strength of each association is summarised by Cohen's d, a measure of effect size. By convention, Cohen's d values in the range of 0.20 are described as small, 0.50 as moderate and 0.80 as large effect sizes (Cohen, 1988).

Examination of Table 23 shows the following. There were clear statistically significant ($p < .05$) differences between earlier and delayed onset parent groups across all measures of adult functioning outcomes. In all cases these indicate that those who transitioned into parenthood prior to the age of 27 had poorer socio-economic well-being, household composition, psychosocial well-being, lower educational attainment, and greater mental health problems than delayed onset parents. More specifically, those with an earlier transition to parenthood had annual household incomes at age 40 that were almost $39,000 lower on average; substantially lower rates of home ownership (51.69% vs. 78.60%); were less likely to attain a higher qualification (22.36% vs. 53.74%) or to be in a steady long-term relationship (66.18% vs. 86.01%) than those with a later transition to parenthood.

The largest effect size differences ranged from moderate to strong ($d = 0.50$ to 0.71) for the domains of socio-economic well-being and educational attainment. Small to moderate effect size differences ($d = 0.15$ to 0.44) were observed for the remaining domains of

household composition, psychosocial well-being and mental health. The clear indication, conveyed in Table 23 is that as a group, parents who transitioned earlier in life (prior to 27 years old), had a more disadvantaged profile across a broad spectrum of adult functional outcomes in mid-life.

Table 23
Bivariate associations between onset of parenthood and adult functioning outcomes at age 40

Adult functioning outcome	Early onset N = 207	Delayed onset N = 486		Cohen's d
Socio-economic well-being				
%(n) Home ownership	51.69 (107)	78.60 (382)	$\chi^2(1)=50.61$, $p < .0001$	0.56
M(SD) Socio-economic status	44.47 (16.33)	52.82 (16.44)	$F(1,692) = 37.60$, $p < .0001$	0.50
M(SD) Gross family income (NZD, 000)	101.28 (60.91)	140.20 (71.74)	$F(1,685) = 46.30$, $p < .0001$	0.53
M(SD) Material well-being	26.10 (8.71)	29.67 (5.67)	$F(1, 692) = 40.96$, $p < .0001$	0.53
Education				
%(n) Higher education	22.36 (55)	53.74 (273)	$\chi^2(1) = 66.41$ $p < .0001$	0.64
Household composition				
%(n) Long-term relationship	66.18 (137)	86.01 (418)	$\chi^2(1) = 35.78$, $p < .0001$	0.44
M(SD) Household crowding	0.70 (0.30)	0.66 (0.23)	$F(1,691) = 4.33$ $p = .04$	0.15
Psychosocial well-being				
M(SD) Social support	47.78 (10.40)	51.38 (7.78)	$F(1, 687) = 25.05$, $p < .0001$	0.41
M(SD) Self-esteem	31.77 (4.66)	33.26 (4.45)	$F(1, 686) = 15.75$, $p <.001$	0.32
M(SD) Life satisfaction	42.84 (6.00)	43.91 (4.91)	$F(1, 687) = 6.01$, $p =.02$	0.20
Mental health				
M(SD) Total number of disorders	0.57 (0.98)	0.30 (0.67)	$F(1, 692) = 16.95$, $p <.0001$	0.33

6.10 Parenthood and Adult Functional Outcomes

6.10.1 Parenthood and Adult Functional Outcomes by Sex at Birth

Table 24 examines the extent to which there were onset of parenthood and sex differences in outcomes and whether the strength of the associations between the onset of parenthood groups and outcomes varied with sex. The table reports the mean or rate of each

outcome for early and delayed onset of parenthood separated by sex. For each outcome, regression models were fitted to the data to test for (a) the main effect of the onset of parenthood, (b) the main effect of sex and (c) sex at birth by onset of parenthood interactions, where the strength of the association between the onset of parenthood and outcomes vary with sex.

Consistent with the findings in Table 23 there was a statistically significant main effect for onset of parenthood for all outcomes. Parents who transitioned earlier had more disadvantageous outcomes than those who delayed parenthood. In contrast, there was a significant main effect of sex for only two outcomes: Fathers were more likely to live in a crowded household than women ($p = .003$) and on average more mothers reported attaining higher educational qualifications than fathers ($p < .0001$). Finally, there was no evidence that the strength of association between onset of parenthood and outcomes varied with sex at birth (all interaction tests were non-significant).

The findings in Table 24 are consistent with previous findings and indicate that as a group, those who transitioned into parenthood earlier, had a more disadvantaged profile for socio-economic well-being, household composition, psychosocial well-being, education, and mental health. The same general pattern of association applied equally for females and males. However, women had better outcomes on average in relation to crowding and educational attainment.

Table 24
Association between the onset of parenthood and adult functioning outcomes at age 40 by sex at birth

	Early onset N = 138 F N = 69 M	Delayed onset N = 233 F N = 253 M	Onset main effect	Sex at birth main effect	Interaction
Socio-economic well-being					
%(n) Home ownership					
Female	54.35 (75)	78.97(184)	<.0001	.42	.45
Male	46.38 (32)	78.26 (198)			

	Early onset N = 138 F N = 69 M	Delayed onset N = 233 F N = 253 M	Onset main effect	Sex at birth main effect	Interaction
M(SD) Socio-economic Status					
Female	45.93 (17.28)	53.57 (16.69)	<.0001	.08	.30
Male	41.54 (13.90)	52.13 (16.21)			
M(SD) Gross family income (000)					
Female	100.76 (63.62)	136.53 (72.08)	<.0001	.30	.64
Male	102.30 (55.57)	143.58 (71.41)			
M(SD) Material well-being					
Female	25.25 (8.95)	28.79 (6.08)	<.0001	<.0001	.49
Male	27.81 (7.99)	30.48 (5.14)			
Education					
%(n) Higher Education					
Female	24.38 (39)	62.66 (151)	<.0001	<.0001	.45
Male	18.60 (16)	45.69 (122)			
Household composition					
%(n) Long-term relationship					
Female	63.77 (88)	84.98 (198)	<.0001	.25	.69
Male	71.01 (49)	86.96 (220)			
M(SD) Household crowding					
Female	0.69 (0.25)	0.62 (0.18)	.01	.003	.43
Male	0.72 (0.37)	0.69 (0.26)			
Psychosocial well-being					
M(SD) Social Support					
Female	48.35 (10.23)	51.54 (7.46)	<.0001	.31	.35
Male	46.65 (10.73)	51.24 (8.08)			
M(SD) Self-esteem					
Female	31.54 (4.51)	32.90 (4.60)	<.0001	.05	.99
Male	32.22 (4.96)	33.58 (4.30)			
M(SD) Life Satisfaction					
Female	43.09 (6.03)	44.13 (5.14)	.01	.22	.73
Male	42.35 (5.95)	43.71 (4.69)			
Mental health					
M(SD) Total Disorders					
Female	0.62 (1.02)	0.26 (0.58)	<.0001	.92	.07
Male	0.45 (0.88)	0.34 (0.74)			

6.10.2 Parenthood and Adult Functioning Outcomes by Māori Descent

Table 25 examines the extent to which there were onset of parenthood and Māori/non-Māori differences in outcomes and whether the strength of the associations between the onset

of parenthood and outcomes varied with Māori descent. The table reports the mean or rate of each outcome for parents in each group separated by Māori descent. For each outcome, regression models were fitted to the data to test for (a) the main effect of the onset of parenthood, (b) the main effect of Māori descent and (c) Māori descent by onset of parenthood interactions, where the strength of the association between the onset of parenthood and outcomes vary with Māori descent. Examination of the table shows:

Consistent with Table 22 there was a significant main effect for onset of parenthood for all outcomes, whereby parents who transitioned earlier had more disadvantageous outcomes than those who delayed parenthood, with the exception of household crowding which was non-significant (p = .10). In contrast there was a significant main effect of Māori descent for only three outcomes: Māori parents had lower rates of home ownership (p =.001) and lower socio-economic status (p = .02) than non-Māori parents; on average non-Māori parents reported attaining higher levels of educational attainment than Māori parents (p = .001). Finally, there was no evidence that the strength of association between the onset of parenthood and outcomes varied with Māori descent (all interaction tests were non-significant).

The results conveyed in Table 25 is.0 consistent with previous findings, as a group those who transitioned into parenthood earlier generally had a more disadvantaged profile for socio-economic well-being, household composition, psychosocial well-being, education and mental health. The same general pattern of association applied equally for Māori and non-Māori. However, on average, non-Māori had better outcomes in relation to home ownership, socio-economic status, and educational attainment.

Table 25
Association between the onset of parenthood and adult functioning outcomes at age 40 by Māori descent

	Early onset N = 61 Māori N = 146 Non-Māori	Delayed onset N = 62 Māori N = 424 Non-Māori	Onset main effect	Māori descent main effect	Interaction
Socio-economic well-being					
%(n) Home ownership					
Māori	44.26 (27)	59.68 (37)	<.0001	.001	.22
Non-Māori	54.79 (80)	81.37 (345)			
M(SD) Socio-economic Status					
Māori	42.61 (15.37)	49.26 (15.37)	<.0001	.02	.72
Non-Māori	45.25 (16.70)	53.34 (16.54)			
M(SD) Gross family income (NZD, 000)					
Māori	93.54 (52.63)	133.79 (71.18)	<.0001	.14	.80
Non-Māori	104.46 (63.89)	141.12 (71.86)			
M(SD) Material Well-being					
Māori	25.90 (7.74)	29.87 (5.37)	<.0001	.98	.72
Non-Māori	26.18 (9.08)	29.65 (5.71)			
Education					
%(n) Higher Education					
Māori	14.67 (11)	37.50 (24)	<.0001	.002	.90
Non-Māori	25.73 (44)	56.08 (249)			
Household composition					
%(n) Steady Long-Term Relationship					
Māori	63.93 (39)	80.65 (50)	<.0001	.20	.41
Non-Māori	67.12 (98)	86.79 (368)			
M(SD) Household crowding					
Māori	0.75 (0.35)	0.68 (0.21)	.10	.09	.39
Non-Māori	0.68 (0.27)	0.66 (0.23)			
Psychosocial well-being					
M(SD) Social Support					
Māori	47.41 (10.31)	50.80 (8.04)	<.0001	.47	.99
Non-Māori	47.94 (10.47)	51.47 (7.75)			
M(SD) Self-esteem					
Māori	31.74 (4.08)	33.44 (4.23)	<.0001	.97	.91
Non-Māori	31.78 (4.90)	33.23 (4.46)			
M(SD) Life Satisfaction					
Māori	42.89 (5.48)	43.57 (5.19)	.02	.89	.95
Non-Māori	42.82 (6.22)	43.96 (4.87)			
Mental health					
M(SD) Total Disorders					
Māori	0.59 (0.97)	0.29 (0.55)	<.0001	.56	.74
Non-Māori	0.56 (0.98)	0.30 (0.69)			

6.11 Associations Between Onset of Parenthood and Adult Functioning Outcomes, After Adjustment for Childhood and Adolescent Covariate Factors

The preceding analyses raises the possibility that the disadvantaged adult outcomes for those who transition into parenthood earlier in life may be explained by the childhood and adolescent factors that were associated with the earlier onset of parenthood (see Chapter 2). To address this issue, further analyses were conducted in which associations between the onset of parenthood (earlier or delayed) and each adult functioning outcome at age 40 were adjusted for sex, Māori descent, socio-economic and family background, childhood abuse, school achievement, adolescent and individual traits. For dichotomous measures, logistic regression analyses were conducted, and for continuous measures, multiple linear regression was used. The results of these analyses are presented in Table 26, which shows covariate-adjusted means and percentages for each outcome in each parenting group. The table also reports the test of significance of the adjusted associations, covariate-adjusted effect size estimates, and the statistically significant covariates in the adjustment model for each outcome. (See statistical methods for more detail on the model fitting and adjustment process, section 5.7)

Adjustment for potentially confounding childhood and adolescent factors substantially reduced the strength of the observed associations between the onset of parenthood and all outcomes. Prior to this adjustment, effect size estimates (Cohen's *d*) ranged from 0.15 to 0.71 with a median of 0.44 (Table 23) and after adjustment, effect sizes ranged from 0.04 to 0.31, with a median of 0.17.

For the four outcomes – home ownership, annual gross family income, higher educational attainment and steady long-term relationship – there remained statistically significant group differences after adjustment. For these outcomes, the adjusted effect size

estimates were in the small to moderate range (Cohen's d = 0.23–0.31). For the remaining outcomes, adjustment for confounding factors reduced the associations to the point of statistical non-significance and the adjusted effect size estimates were typically in the very weak to modest range (Cohen's d = 0.04–0.18).

A wide range of covariate factors contributed to explaining the observed between-group differences in outcomes. These factors spanned domains reflecting childhood socio-economic disadvantage, family instability/dysfunction, exposure to child abuse/family violence, child academic attainment, and child behavioural/personality characteristics. Childhood socio-economic disadvantage was most relevant to adult socio-economic well-being, education, and household composition. Childhood abuse, education skill or ability, and childhood or adolescent behaviour, personality and characteristics were relevant to all domains except household composition. Finally, family instability and dysfunction were relevant to all domains of adult outcomes.

These findings suggest that many of the apparent differences in adult outcomes between those who made an early or late transition to parenthood appear to reflect the effects of pre-existing disadvantageous childhood, family and individual characteristics associated with an early transition to parenthood, rather than the effects of the onset of parenthood per se. For the majority of outcomes, when these factors were taken into account, any remaining between-group differences in outcome were typically modest and statistically non-significant. However, for four outcomes including (home ownership, annual gross family income, higher educational attainment and steady long-term relationship) there remained small to moderate effect-size differences after covariate adjustment, suggesting the need to explore additional explanatory processes/pathways leading to the more disadvantaged status of those who made an early transition to parenthood across these outcomes. This issue is explored further next in section 5.12.

Table 26

Association between the onset of parenthood and life course outcomes adjusted for childhood and adolescent factors

	Early onset N=207*	Delayed onset N=486*	*p*	Cohen's *d*	Significant covariates*
Socio-economic well-being					
% Home ownership	62.74	74.07	.004	0.24	D, G, H, M, P, T, U
Mean Socio-economic Status	48.82	50.97	.10	0.13	B, D, N, O, P
Mean Gross family income (NZD, 000)	113.37	134.75	<.0001	0.29	A, D, K, O, P, U
Mean Material well-being	27.78	28.92	.06	0.18	A, D, F, J, L, M, P
Education					
% Higher Education	34.00	47.69	<.0001	0.28	B, C, D, I, J, O, P, R, T, U
Household composition					
% Steady Long-Term Relationship	70.68	84.67	<.0001	0.31	H, I, K
Mean household crowding	0.68	0.67	.53	0.04	A, D, G
Psychosocial well-being					
Mean Social Support	49.24	50.76	.05	0.17	G, K, L, M, O
Mean Self-esteem	32.50	32.94	.26	0.10	K, L, M, N, Q
Mean Life Satisfaction	43.39	43.67	.54	0.05	E, K, M, N, Q
Mental health					
Mean Total Number of Disorders	0.40	0.36	.54	0.05	F, H, I, J, K, L, M, S, U

Note Logistic regression/z test for dichotomous and linear regression / *t* test for continuous variables

*A – Gender, B – Socio-economic status (birth), C – Mothers education, D – Average family living standards, E – Mother's age at birth, F – Born into a two-parent family, G – Change of parents, H – Parental violence, I – Parental offending, J – Parental substance use, K – Parental Attachment, L – Childhood physical abuse, M – Childhood sexual abuse, N – Conduct disorder, O – Scholastic ability, P – Scholastic performance, Q – Neuroticism, R – Deviant peers, S – Depression prior to 15, T – Early sexual intercourse, U – Novelty seeking

6.12 Mediating Pathways Between Early Parenthood and Outcomes

Four of the adulthood outcomes previously examined continued to display significant group differences after controlling for childhood and adolescent covariate factors, whereby those who delayed parenthood had higher rates of home ownership, education, steady long-term relationships and overall higher gross family incomes. Each of these outcomes were examined further to identify whether the residual differences could be explained by mediating pathways from early parenthood to later outcomes after adjustment for the childhood and adolescent covariate factors. A series of extended regression models was conducted with a range of mediating measures that were selected from the study database. The variables were selected to reflect potential mediating pathways in the interval from age 25 to 35 years. Each variable was included based on being an explanatory variable in the literature and spanned the following domains.

a) Employment and socio-economic well-being: engagement in the workforce as measured by months in employment, occupational choice as measured by the NZSEI, accumulated net family assets,
b) Partner relationships factors: measures of partner antisocial behaviour and total number of partners between the ages of 25 and 35 years.
c) Extent of social support, mental health and well-being as measured by: social support of family and friends; total number of mental health disorders and substance-use problems.

These variables were selected on the basis of previous literature and preliminary analyses to test whether on an individual basis the measures met the minimum Baron and Kenny (1986) criteria for mediation for at least one of the outcomes: "(a) variations in levels of the independent variable significantly account for variations in the presumed mediator (Path a). (b) variations in the mediator significantly account for variations in the dependent

variable (Path b) and (c) when paths a and b are controlled, a previously significant relation between the independent and dependent variables are no longer significant, with the strongest demonstration of mediation occurring when path c is zero." (Baron & Kenny, 1986, p. 1176)

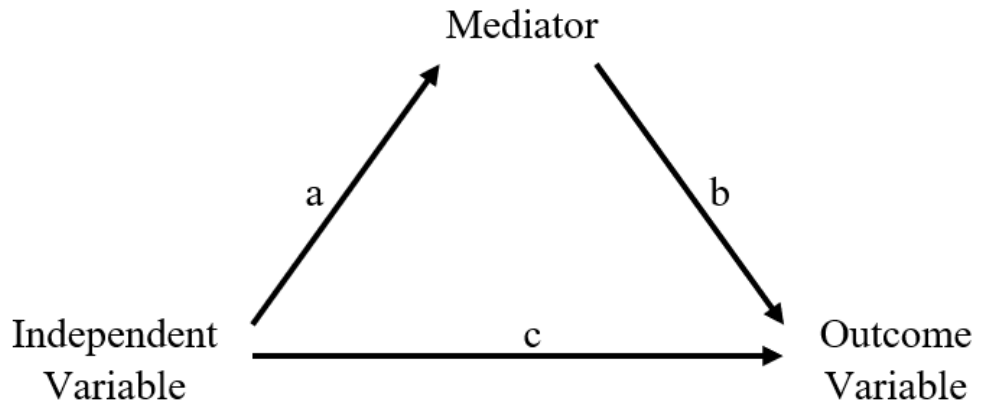

Figure 5 Mediational Model

6.12.1 Strength of Association Between Mediating Pathways and Outcomes

For the four relevant outcomes, Table 27 summarises the spearman correlations and tests of significance between the selected mediators and (a) the onset of parenthood; and (b) the four relevant outcomes as displayed in a correlation matrix.

- For the onset of parenthood, the correlations indicate that those who delayed parenthood had greater employment, had higher status occupations, accumulated greater assets, were less likely to select an antisocial partner, had fewer changes of partner, greater social support and less mental health problems than those who transitioned to parenthood early.
- For home ownership and gross family incomes at age 40, the correlations indicate that homeowners and families with higher gross incomes engaged more often in full-time

employment, had higher status occupations, accumulated greater assets, were less likely to select an antisocial partner, greater social support and less mental health problems than non-home owners and families with lower gross incomes.

- For educational attainment, the correlations indicate that those with higher educational qualifications engaged in less full-time employment, had higher status occupations, accumulated greater assets, were less likely to select an antisocial partner, had greater social support and less mental health problems than those with lower educational qualifications.
- Finally, for long-term steady relationships, the correlations indicate that those who were in long-term relationships engaged in less full-time employment, had higher status occupations, accumulated greater assets, were less likely to select an antisocial partner, had more changes of partner, greater social support and less mental health problems than those who were not in long-term relationships.

Table 27
Correlation matrix of mediating variables, onset of parenthood and four significant adulthood functioning outcomes

Mediating variable	Onset of Parenthood	Home Ownership	Gross Family Income	Higher Education Attained	Steady Long-term Relationship
	Spearman's r				
Employment in the Workforce	**0.29*** **	**0.13** **	**0.26*** **	**−0.07*+**	**0.09***
Occupational Choice	**0.33*** **	**0.27*** **	**0.47*** **	**0.60*** **	**0.17*** **
Accumulated Net Assets	**0.37*** **	**0.31*** **	**0.49*** **	**0.27*** **	**0.23*** **
Partner Antisocial Behaviour	**−0.33*** **	**−0.32*** **	**−0.36*** **	**−0.22*** **	**−0.41*** **
Total Number of Partners by 25-35	**−0.10***	−0.06	0.05	−0.04	**0.07***
Social Support	**0.22*** **	**0.18*** **	**0.26*** **	**0.20*** **	**0.15*** **
Total number of mental health disorders	**−0.19*** **	**−0.13** **	**−0.17*** **	**−0.09***	**−0.12*** **

* p < .05, ** p < .01, *** p < .0001, + partial correlation was calculated to control for prior disadvantage of educational attainment by 25 years of age.

6.12.2 Regression modelling of outcomes to account for mediating factors

The regression models for childhood and adolescent fixed factors were extended to include relevant mediating factors for each outcome and then refined to include only the mediators that best explained the remaining differences in outcomes between earlier and delayed onset of parenthood. For higher educational attainment, the model also included the variable measuring the highest qualification attained by 25 years of age to control for any prior educational disadvantage amongst those who transitioned earlier into parenthood.

The results in Table 28 show the marginal adjusted rates and means for the adult outcomes after the inclusion of mediators, tests of significance of adjusted associations and relevant mediators for each outcome. All the differences between the early and delayed onset

of parenthood were substantially reduced to the point of statistical non-significance. The key mediators for each pathway are summarised below:

- The key mediating pathways for home ownership and gross family income included higher occupational status choice, greater accumulated net assets, and less partner antisocial behaviour.
- For steady long-term relationship, the key mediating pathways were higher occupational status choice, less partner antisocial behaviour and greater social support.
- Finally, the key mediating pathways for higher educational attainment included higher occupational status choice, less partner antisocial behaviour and less engagement in the workforce.

In summary, the above findings suggest that any residual effect of early onset of parenthood, after adjustment for childhood and adolescent fixed factors, appears to be explained by a common set of mediating processes reflecting the fact that those who delayed parenting onset had more advantageous mediating pathways. Amongst those who delayed parenthood, this more advantageous pathways is, by better occupational choices, economic security, better partner selection and greater social support, which in turn were related to better outcomes at age 40. The one exception to this was the mediating pathway between workforce participation and educational attainment, whereby delayed parenthood was associated with greater workforce participation between the ages of 25 and 35 years. However, greater participation in the workforce was also associated with lower educational attainment when prior educational attainment to age 25 was taken into account. Thus, the gap in higher educational attainment by age 40 reflected a combination of positive and negative mediating pathways, some of which provided an increased opportunity to gain higher

qualifications by age 40 and one of which reduced opportunity independent of prior educational attainment.

Table 28
Association between the onset of parenthood and life course outcomes adjusted for childhood and adolescent factors as well as adult mediating factors

	Early onset N = 207	Delayed onset N = 486	*p*	Cohen's *d*	Significant covariates
Socio-economic well-being					
% Home ownership	69.31	71.07	.65	.04	A, B, D
Mean gross family income (NZD, 000)	133.08	127.67	.35	.06	A, B, D
Education					
% Higher Education	41.89	46.57	0.22	.02	A, C, D, F
Household composition					
% Steady long-term relationship	78.00	81.47	.29	.10	A, D, E

Note A – Occupational choice, B – Accumulated Net Assets, C - Engagement in the workforce D – Partner Antisocial Behaviour, E – Social Support, F – Educational Attainment by 25

6.13 Moderation; Sex at Birth and Māori Descent

Tests of statistical interaction between sex at birth, Māori descent and identified mediating factors showed no evidence of significant moderation effects of either sex or Māori descent on the mediating pathways from the onset of parenthood to the above outcomes.

6.14 Māori Cultural Affiliation

6.14.1 Role of Māori Cultural Affiliation in Multivariable Models

Additional analyses were conducted for the Māori participants in the study to examine the role of Māori cultural affiliation between the ages of 21 and 25 as an explanatory variable for between-group differences in any of the adulthood outcomes. At the bivariate level there was no association between Māori cultural scores earlier in life and any of the life course outcomes except for greater household crowding ($r = .28$, $p < .0001$). Specifically, this association indicated that those with higher cultural affiliation scores also reported more household crowding. When cultural affiliation was added as a further explanatory factor in the previously identified multivariable models the control for childhood and adolescent

factors, it was not a significant covariate for any of the adulthood outcomes at age 40. These findings suggest that, within the limitations of the sample size for Māori parents, Māori cultural affiliation did not appear to contribute to explaining group differences at the multivariable level beyond what was previously identified.

6.14.2 Māori Cultural Affiliation at 40

The results in Table 29 shows the cultural affiliation scores at age 40 in the early and delayed parenthood groups within the Māori cohort. For the observed mean (SD) score, there was a moderate effect size (d = .32) difference between the two Māori parent groups. Parents who transitioned to parenthood earlier in life had significantly higher cultural affiliation scores reflecting greater knowledge, engagement, connection, and less negative perceptions. When prior cultural affiliation scores between ages 21 and 25 years were taken into consideration, the effect size was reduced from moderate to small and no group differences remained between early and delayed Māori parent groups.

Table 29
Association between the onset of parenthood and Māori culture adjusting for prior history of Māori cultural scores

	Early onset of parenthood	Delayed onset of parenthood	*p* value	Cohen's *d*
Unadjusted[1]	22.78	19.59	.04	.32
Adjusted[2]	21.69	21.98	.78	.04

Note 1: Observed M(SD) 2: Marginal Mean adjusted for prior cultural affiliation.

6.15 Summary of Study 2 Findings

The purpose of this study was to examine the association between the onset of parenthood and longer-term adult functional outcomes at age 40. As well as identify and explain any differences between mothers and fathers or Māori and non-Māori parents. This was achieved using the CHDS longitudinal data of a birth cohort. A summary of the findings

will be outlined below. The interpretation of the study findings, their relation to previous research and implications will be discussed in the general discussion (see Chapter 6).

There were consistent bivariate associations between the onset of parenthood and each of the adult functional outcomes. As hypothesised earlier onset of parenthood was associated with lower socio-economic well-being, lower rates of higher educational attainment, less advantageous household composition, poor psychosocial well-being, and more mental health problems. Furthermore, three significant ($p < .05$) sex at birth and Māori descent differences were also identified. Being female was associated with lower material well-being, attaining higher levels of education and less household crowding, whereas for Māori descent, being non- Māori was associated with higher rates of homeownership, higher socio-economic status and attainment of higher levels of education.

Consistent with the hypotheses (see section 2.7), the present study showed that childhood and adolescent factors associated with an early onset of parenthood were also associated with group differences in adulthood outcomes. These included: lower socio-demographic background, non-traditional family structure, family dysfunction, childhood abuse exposure, deviant or antisocial child behaviour, less school achievements, adolescent factors, and individual traits. When controlling for the childhood and adolescent covariate factors, the magnitude of difference between the two onset of parenthood groups for each adult functional outcome reduced. However, even after controlling for confounding factors, there remained statistically significant ($p < .05$) associations between the onset of parenthood and four adult functional outcomes whereby earlier onset of parenthood had: lower rates of home ownership, lower gross family income, less educational attainment, and less likely to be in a steady long-term relationship. Furthermore, after controlling for additional mediating variables – higher occupational status, accumulated net assets, engagement in the workforce, partner antisocial behaviour and social support, the associations between the onset of

parenthood and four adult functional outcomes (homeownership, gross family income, higher educational attainment, and steady long-term relationships) were no longer statistically significant. In regard to the latter analyses, estimates of Cohen's *d* for the adjusted associations ranged from 0.02 to 0.18 with a median value of 0.06. The magnitude of these effect sizes suggests only a weak associations between the onset of parenthood and adulthood functional outcomes when controlling for childhood and adolescent factors and adulthood mediating factors.

Overall, the present study found no sex or Māori descent differences at the multivariable level, indicating that neither sex at birth nor being of Māori descent or not were not associated with differential outcomes at age 40. Furthermore, among the Māori parents, Māori cultural affiliation was not associated with any adulthood functional outcomes above any childhood or adolescent factors. This suggests that cultural affiliation is not associated with the differences observed in younger and older parents. Finally, at the bivariate level there was an association between the onset of parenthood for the Māori participants and cultural affiliation at age 40. However, when controlling for Māori cultural affiliation during the early to mid-twenties, the association was no longer significant.

Chapter 6: Discussion

The purpose of the research described in this dissertation was to comprehensively examine the transition to parenthood and life course outcomes in the Christchurch Health and Development Study cohort. This research was able to provide new knowledge to the literature by focusing on gender and ethnic differences in both the onset of parenthood and life course outcomes associated with this.

The literature reviewed in Chapters 1 and 2 clearly highlighted some important gaps within the literature. Considering that the majority of the literature examining the onset of parenthood and subsequent outcomes was predominately focused on young mothers, little was known about delayed parenthood or fathers. Likewise, there was very little research focused on understanding Māori and non-Māori differences in parenthood and outcomes nor the role that Māori cultural affiliation may contribute. Thus, this dissertation designed two studies that focused on addressing these gaps within the literature, and the key findings will be discussed below in the relevant sections.

7.1 Summary of Key Findings

Study 1 examined the onset of parenthood in the CHDS cohort up to age 40 and identified factors predictive of an early versus a delayed transition to parenthood. Study 2 examined whether any differences in life course outcomes in adulthood could be explained by prior childhood and adolescent characteristics, or by mediating processes associated with an earlier onset of parenthood. As noted above, a particular aim of both studies was to examine gender and ethnic differences in (a) the timing of the transition to parenthood, (b) the nature of the associations between risk factors and the onset of parenthood, and (c) the associations between timing of parenthood and subsequent outcomes. Both studies also explored the role of cultural affiliation as an additional explanatory factor within the Māori cohort. The key findings of both studies are summarised below.

1. When examining the onset of parenthood by gender and ethnicity across the ages of 16 to 40 years, there was clear evidence of gender and ethnic differences in the age of onset of parenthood. This reflected an initial divergence and then convergence in the rate of transition to parenthood with increasing age. Specifically, females and Māori showed a more rapid transition to parenthood up to the age of 26, with these gaps closing to some extent as the cohort aged. Gender and Māori ethnic differences were observed for an earlier onset of parenthood, but not for delayed onset of parenthood.
2. Earlier transition to parenthood was associated with both advantageous and disadvantageous factors. These included greater disadvantage relating to family, social and individual disadvantage during childhood and adolescence, as well as positive time dynamic factors that included relationship and economic stability. On the other hand, delayed onset of parenthood was not associated with any childhood or adolescent adverse factors, rather delayed onset of parenthood was only associated with economic and relationship stability.
3. Gender and Māori ethnic differences in the transition to early parenthood were not explained by prior childhood/adolescent disadvantage nor time dynamic predictors. The strength and nature of the associations between the identified predictors and the onset of parenthood did not vary within either gender or ethnicity. Within the Māori cohort, stronger Māori cultural affiliation was associated with an earlier onset of parenthood, whereas weaker Māori cultural affiliation was associated with delayed parenthood.
4. For every outcome assessed, younger parents were more likely to be disadvantaged than peers who delayed parenthood. The disadvantage experienced by younger parents was associated with an accumulation of childhood and adolescence adversity as well as reduced support and opportunities during early adulthood.

5. For the outcomes assessed, there was some evidence of gender and ethnic inequalities. Females had lower material well-being, greater educational attainment and less household crowding. Māori had lower rates of home ownership, socio-economic status and educational attainment. When examining potential explanatory factors for the differences in outcomes, no gender or ethnic inequalities remained. Nor was there evidence to suggest that the size of the outcome difference between early and later parenthood varied with either gender or ethnic identity.

The remainder of this discussion will be structured in the following manner. Firstly, the findings for each aim and hypothesis will be discussed in the context of the wider literature; secondly the implications of the PhD findings are identified; thirdly the strengths and limitations of the current research is discussed, followed by recommendations for future research.

7.2 Differences between Mothers and Fathers in the Onset of Parenthood

As hypothesised, females had a more rapid onset of parenthood earlier in life than males. When comparing the onset rate of parenthood by gender, a difference was observed in the onset of parenthood between males and females up to age 26 (16%, 25% respectively), which reduced by age 40 (70%, 78% respectively). These trends are consistent with the national demographics statistics for the period 1990–2018, showing that the median age of mothers has consistently been lower than for fathers (Statistics New Zealand, 2019b).

To understand the gender differences observed in the rate of early parenthood in Chapter 4, two aspects were explored. Firstly, the effect of gender in the onset of early parenthood, independent of other predictors; secondly, whether there were any gender differences in the strength of associations between predictive factors and the early onset of parenthood, both of which will be discussed in further detail below.

Even when accounting for the full set of prospective measures identified in Study 1, females aged up to 26 years had a rate of transition to parenthood that was 2.34 times higher than for males. However, beyond age 26 years, this difference became negligible, with the adjusted transition rate (0.95) being slightly in favour of males, albeit non-significantly. The observation that females had substantially higher rates of an earlier transition to parenthood even when accounting for childhood and adolescent factors as well as time-dynamic processes, raises the question as to the origins of this difference.

Evidence suggests that the majority of pregnancies earlier in life are unplanned (Boden et al., 2008; Furstenberg Jnr, 2003; Van der Klis et al., 2002). Since women are more likely to have an emotional attachment during pregnancy to the developing foetus, it is possible that there are underlying gender differences in choosing to carry a pregnancy to term because motherhood may also provide a sense of identity to kinship groups or the community (Hamburg, 1986; Wilson & Huntington, 2005). Therefore, women may be more likely to choose to continue with a pregnancy than opt for alternatives such as termination (which may be more favoured by men).

Another potential explanation for gender differences is partner selection. Previous research consistently shows that men are more likely to sexually partner with younger women, or conversely women choose to partner with older men (Drefahl, 2010; Fernandez, Ruch-Ross & Montague, 1993; Kaestle, Morisky & Wiley, 2002). In the context of young adult relationships with high rates of sexual risk-taking and unplanned pregnancy, then all other things considered, this will probably result in more women becoming parents at a younger age than men (Fernandez et al., 1993; Fullerton et al., 1997; Gormez-Scott & Cooney, 2014; Kaetle et al., 2002).

In the current research, clear gender differences in the onset rate of early parenthood were observed, even when other predictive factors were taken into account. An extension of

the prediction model to consider gender by predictive factor interactions showed no evidence of significant interactions for either early onset or delayed onset parenthood. That is, the strength of the associations between each factor in the final model and the onset of parenthood did not appear to differ between females and males. The clear implications of these results is that (a) within this cohort, males and females share a diverse but common set of social, family and individual life course predictors of the transition to parenthood; and (b) these common factors predict the onset of parenthood in the same way for both gender groups.

7.3 Māori and Non-Māori Differences in the Onset of Parenthood

As hypothesised, Māori had a more rapid onset of parenthood earlier in life than non-Māori. When comparing the onset rate of parenthood by Māori ethnic identity, a divergence was observed in the onset of parenthood between Māori and non-Māori up to age 26 (40%, 15%, respectively), which reduced by age 40 (78%, 72%, respectively). These trends are consistent with the national demographics statistics for the period 1990–2018, showing that the median age of mothers has consistently been lower for Māori parents than for non-Māori parents (Statistics New Zealand, 2019b).

In an attempt to understand the differences observed in Chapter 4 between Māori and non-Māori in the onset of early parenthood, three aspects were explored. Firstly, the effect of Māori ethnicity in the onset of parenthood independent of other predictors; secondly, whether there were any differences between Māori and non-Māori in the factors that predict the onset of early parenthood; finally, the role of Māori cultural affiliation in the onset of parenthood within the Māori cohort. Each of these aspects will be discussed in further detail below.

Even when accounting for the full set of prospective measures identified in Study 1, Māori aged up to 26 years had a rate of transition to early parenthood that was 1.61 times higher than for non-Māori. However, beyond age 26 years, this difference became negligible,

with the adjusted transition rate (0.86) being slightly in favour of non-Māori, albeit non-significantly. Even when accounting for childhood and adolescent factors as well as time-dynamic processes, Māori continued to have substantially higher rates of earlier parenthood. Thus, the origins of this difference can be queried.

As the majority of the literature examines early parenthood from a western ethnocentric perspective, an earlier onset of parenthood is often considered in the context of detracting from later life outcomes such as education, career, and wealth. In turn, this results in earlier parenthood being framed as a barrier to personal fulfilment. Since Māori are traditionally a collectivist culture that values whānau and kinship groups, it is possible that some Māori may not actively avoid earlier parenthood, with some deliberately choosing to become parents at a younger age. This decision may be due to Māori having different life course aspirations that value family and social capital over higher status jobs and wealth (Houkamau & Sibley, 2017). This may also be reflected in Māori cultural orientation towards wealth sharing rather than personal wealth accumulation (Houkamau et al., 2019). Therefore, further research is needed to explore the extent of intentional and unintentional parenthood among young Māori parents, as well as differences in the underlying mechanisms.

In the current research, despite clear differences between Māori and non-Māori in the onset rate of early parenthood, the ethnicity by predictive factor interactions were not significant for either early onset or delayed onset parenthood. That is, the strength of the associations between each factor in the final model and the onset of parenthood did not appear to differ between Māori and non-Māori. The clear implications of these results is that (a) within this cohort, Māori and non-Māori share a diverse but common set of social, family and individual life course predictors of the transition to parenthood; and (b) these common factors predict the onset of parenthood in the same way for both Māori and non-Māori groups.

A strength of the current research was a detailed examination of the role of Māori cultural affiliation in predicting both early and delayed onset of parenthood. Due to the analyses being restricted to the Māori cohort and subsequent reduction in analytic power, there was a limitation on the complexity of the statistical models that could be fitted. Within this research, Māori cultural affiliation was a measure of knowledge, engagement, perceptions, and connection. Greater Māori cultural affiliation was found to be associated with earlier onset of parenthood, whereas a lower Māori cultural affiliation was found to be associated with delayed parenthood. This may reflect traditional Māori values and attitudes that were once renowned for supporting childbearing regardless of age because children allow the continuation of whakapapa (lineage; Dickson et al., 2000; Pihama, 2011). Furthermore, for Māori, early parenthood may provide an opportunity to form a positive membership to kin networks and community groups (Hamburg, 1986).

In discussing the issue of Māori culture in parenthood, Rawiri (2007) has identified two explanations. Firstly under the traditional Māori cultural perspective, children are valued as the continuation of whakapapa, leading to acceptance of parenthood earlier in the life course and support from whānau (Douglas, 1977; Rawiri, 2007; Rerere, 2018). In this context the prospect of unplanned pregnancy or single parenthood may seem less of a barrier to a fulfilling life, which reflects different values for young Māori parents. In contrast, the Eurocentric values that dominate the parenthood literature do not focus on the family and relationship; instead, it values individual success, which includes educational attainment and economic security to ensure accumulation of personal wealth (Houkamau & Sibley, 2017; Houkamau et al., 2019; Rawiri, 2007). In this context, Māori who hold Eurocentric values may intentionally delay parenthood in pursuit of education, careers and assurance of economic security and relationship stability prior to any childbearing. The implication of identifying Māori culture or lack thereof as being a predictor of early and delayed onset of

parenthood is that all research focused on Māori parents should consider a Māori centred approach. That is, research should focus on Māori people, as Māori. This includes the use of research methods, and the practices employed should reflect knowledge of Māori culture, mātauranga Māori (Māori knowledge) and contemporary realities (Durie, 1998; Forster, 2003).

7.4 What Factors Predict Earlier Onset of Parenthood?

In Study 1, ten factors were identified as being predictive of an earlier onset of parenthood. These included lower family socio-economic status, being born into a single-parent family, childhood exposure to physical abuse, lower scholastic performance during adolescence, association with deviant peers, and sexual intercourse before the legal age of consent (<16 years), as well as alcohol-use problems, less engagement in education, greater engagement in employment and being in a stable relationship during young adulthood.

The finding that lower family socio-economic status was predictive of an earlier onset of parenthood is consistent with previous studies (Dearden et al., 1994; Fagot et al., 1998;; Hobcraft and Kiernan, 2001; Pears et al., 2005; Van der Klis et al 2002). For example, Gest et al. (1999) and Woodward et al. (2006) both found family socio-economic status remained predictive of early parenthood, even when accounting for a range of additional factors ranging from childhood through to early adulthood. One can speculate that the role of family socio-economic status may reflect differences in class culture or attitudes regarding norms in the onset of parenthood (Pears et al., 2005; Ravanera & Fernando, 2004). Likewise, it is possible that being raised in a family with lower socio-economic status may increase barriers to future opportunities such as education or career training (Fergusson & Woodward, 2000; Woodward et al., 2006), which may lead to individuals from lower socio-economic families being less likely to perceive early parenthood as hindering any future opportunities.

Parental role models have been identified as being very influential in the onset of parenthood; the most prominent are being raised by a younger mother and experiencing greater parental disruption (Jaffee et al., 2001; Manlove, 1997; Marie et al., 2011; McLanahan & Bumpass, 1988; Pears et al., 2005; Woodward et al., 2006). The results of this study did not support these findings in particular. While both maternal age and changes of parents were associated with early parenthood at the bivariate level, neither of these featured as predictors in the multivariable model. This possibly reflects the fact that the present research has access to a wider selection of prospective measures throughout childhood than most other studies, as well as a range of time-dynamic factors. However, being born into a single-parent household was found to be a strong predictor of early parenthood, which is still consistent with the findings of others (McLanahan & Bumpass, 1988; Wellings et al., 1999; Woodward et al., 2001). Like socio-economic status, being born into a single-parent household may influence attitudes towards family formation. The ideals of marriage before parenthood may not be as strong in single parents due to the family environment in which they were raised. McLanahan and Bumpass (1988) also suggested that single parent households may have greater difficulty maintaining authority and control when it comes to dating and sexual behaviour. Similarly, social learning and modelling of sexual and partner relationships by mothers in single-parent households, or perhaps lack of paternal investment in childrearing may increase promiscuous sexual activity and earlier onset of parenthood (Ellis et al., 2003).

To date, few studies have examined the association between specific parental practices such as punitive parenting and the onset of parenthood. Consistent with earlier CHDS research, more punitive parenting was found to be predictive of an earlier onset of parenthood for both males and females (Gibb et al., 2014; Marie et al., 2011; Woodward et al., 2006). One potential explanation for this finding is that excessive use of physical

punishment may hasten the young person's exit from the family home and weaken ties with the family (Woodward et al., 2006). Another explanation could be that overly intrusive parental monitoring of behaviour and excessive punishment might increase rebellious behaviours that are also associated with early parenthood: behaviours such as oppositional or conduct disordered behaviour, associating with deviant peers, early substance use and risky sexual behaviour (Gibb et al., 2014; Fergusson et al., 2012; Hockaday et al., 2000; Pears et al., 2005; Thornberry et al., 1997; Underwood et al., 1996; Woodward et al., 2006).

Consistent with the findings here, a number of other studies have also found that poor educational participation and lack of qualifications increases the likelihood of earlier parenthood (Fagot et al., 2988; Hockaday et al., 2000; Marsiglio, 1986; Woodward et al., 2006). The present dissertation findings suggest that lower scholastic performance and lower enrolment in post-high school education or training were associated with an earlier transition to parenthood. It is possible that those with higher educational aspirations are more likely to have different perceptions of the normative age to transition to parenthood, especially when compared with those with low educational goals, who may perceive themselves as having limited opportunities (Crockett & Bingham, 2000; East, 1998; Pears et al., 2005). Another explanation may be that those with lower educational aspirations may have different class or cultural values, which may contribute to a different life course that leads towards earlier parenthood (Ravanera & Fernando, 2004).

The findings in Study 1 indicated that those with an earlier onset of parenthood engaged in more risk-taking behaviours. These included alcohol use, early sexual activity, and engagement with deviant peers. Due to the predominantly retrospective nature of previous studies, the directionality of these relationships has been tentative. Similarly to that of Hockaday et al. (2000), the current research used prospective measures and identified that each of these behaviours preceded an earlier onset of parenthood. Previous research indicates

that these risk-taking behaviours are strongly comorbid, that is, they tend to occur together. Increased alcohol use had been identified as being related to sexual activity (Donovan & Jessor, 1985; Luster & Small, 1994), which may also be associated with riskier sexual behaviours such as lack of contraception (Capaldi et al., 2002). Likewise, evidence supports a relationship between delinquent associates and sexual behaviour (Donovan & Jessor, 1985; Thornberry et al., 1997). Thornberry et al., (1997) offered two possible explanations for this effect. Firstly, associations with deviant peers provide opportunities to develop values and behaviours that are conducive to adult-like behaviours such as sexual intercourse. Secondly, affiliations with deviant peer groups may not be a deterrent to early onset of parenthood; instead it may provide a positive identity of achieving adulthood or contributing something to the world (Burton, 1995; Thornberry et al., 1997). This notion of early onset being related to adult identity is supported by a qualitative study of teenage mothers in Canada (Archibald, 2004), which showed that some young mothers perceived early parenthood as a sense of accomplishment and provided a positive identity as a mother.

The role of childhood and adolescent family dynamics and individual behaviours that increase the likelihood of becoming a younger parent dominate the literature. Study 1 also considered whether a range of time-dynamic factors predicted earlier onset of parenthood. Greater participation in full-time employment was identified as contributing to an increased likelihood of earlier parenthood. It has been suggested that a lack of personal capital and perceived lack of future opportunities may lead to the continuation of pregnancy through to parenthood. Similarly, Ravanera and Fernando (2004) have suggested that earlier participation in employment and higher income increased the likelihood of earlier fatherhood. It was suggested that differences in social class values may influence norms regarding the onset of parenthood (Fagot et al., 1998; Pears et al., 2005; Ravanera and Fernando, 2004). Like previous studies, it is possible that steady employment may contribute to younger people

feeling more confident in starting their family at a younger age than those who pursue higher educational attainment (Ravanaro & Fernando, 2004). It is also possible that earlier participation in the full-time workforce reflects lower educational aspirations, whereby those who leave school early are more likely to be in full-time employment. In contrast, individuals who remain in education may have different expectations of future careers and will be less likely to be in full-time employment at least till their mid-twenties, which may impact their pathway to parenthood.

Long-term relationship stability was identified as increasing the likelihood of earlier parenthood, which may indicate that to some extent early parenthood is a conscious life choice. It is reasonable to speculate that cohabitation and marriage might increase the likelihood of parenthood, as it increases the opportunities for sexual engagement and economic security. Also, some couples may want to start a family at a younger age than others, an aspiration that was not measured by the CHDS. These suggestions were alluded to by Pears et al. (2005), which is one of the few studies to measure relationship status in the prediction of parenthood.

When examining gender, relatively consistent findings throughout the literature suggest that for both males and females the factors that precede the transition to early parenthood are similar. Only two studies have identified gender differences in factors predicting earlier onset of parenthood. Using CHDS data, Woodward et al. (2006) found that being born to a young mother and experiencing greater parental changes during childhood and adolescence were more predictive of earlier motherhood than of fatherhood up to age 25. Using data from the Carolina Longitudinal Study, Xie et al. (2001) identified that socio-economic disadvantage and peer affiliations were more predictive of early motherhood than early fatherhood. To date, no studies have directly examined any gender effects on the predictive factors of delayed parenthood.

Based on the findings in Study 1, there was evidence to suggest that for both Māori and non-Māori the factors that precede the transition to early parenthood are similar. To date, no studies have directly examined any Māori and non-Māori ethnic effects on the predictive factors of early parenthood. Therefore, further research is required to understand these similarities.

7.5 What Factors Predict Delayed Onset of Parenthood?

Unlike early onset of parenthood, for the delayed onset of parenthood beyond the age of 26, none of the childhood and adolescent factors considered in this research were predictive. Instead, three time-dynamic factors were identified as being associated with delays in parenthood. These related to partner relationship stability as well as economic security.

As for early onset of parenthood, long-term relationship stability was identified as increasing the likelihood of delayed parenthood. Also, like early onset parenthood, relationship stability may indicate that, to a large extent, delayed parenthood may be a conscious life choice (Blackburn, et al., 1992; Botting & Dunnell, 2000; Mills et al., 2011; Taniguchi, 1999). The formation of stable long-term relationships provides greater economic security: in turn, this may enable more careful planning and timing of major life course milestones (e.g. home ownership) in relation to the onset of parenthood. Another potential explanation for this effect is the possibility that those who delay may seek out steadier partners or choose to delay parenthood until they are satisfied that they have a stable long-term relationship.

Two forms of economic security were recognised as increasing the likelihood of delayed onset of parenthood. These included more time spent in full-time employment and less financial assistance from the government. It is highly likely that delaying parenthood is a rational strategy (Backburn et al., 1993; Kravdal, 1994; Ravanera & Fernando, 2004). These

findings align with the economic theory of opportunity costs (Taniguchi, 1999) and investment theory (Ravanera & Fernando, 2004). It is possible that pursuit of a career and financial security is prioritised over the onset of parenthood. It is noteworthy that the economic theory of opportunity costs and investment theory also both emphasise the role of education in delaying parenthood.

Within this dissertation, neither the highest qualification attained, nor time spent enrolled in educational institutions was identified as being predictive of delayed parenthood when accounting for additional life course factors. Based on these findings, it cannot be concluded that education does not contribute to delayed parenthood. To some extent, educational attainment or aspirations act as selection factors that influence those who do not have an early parenthood. Therefore, education is relevant to an earlier transition to parenthood, but beyond the age of their late twenties, other factors appear to be more relevant. Based on the current research, it can be suggested that partner relationship and economic stability are better predictors of delayed parenthood.

It is possible that those who delay parenthood may have different expectations of career and pathways to parenthood. This may lead to greater time spent in employment to ensure financial stability and less reliance from the government for financial assistance. It is also possible that the period spent in full-time employment also provides an opportunity to accumulate resources and ensure economic stability prior to having children.

When considering gender, no gender effects were identified in the predictive factors of delayed parenthood. Based on these findings it can be suggested that the pathway towards delayed parenthood is similar for males and females. Likewise, when considering ethnicity, no Māori or non-Māori effects were identified in the predictive factors of delayed parenthood. Thus, it can be suggested that the pathways towards delayed parenthood are similar for Māori and non-Māori. There is no research examining gender or ethnic effects on

predictive factors of delayed parenthood, nor is there literature in contrast to these findings. Further research is required to examine these effects to further understand if the similarities in pathways towards delayed parenthood is a result of the cohort being from a specific time period or the measures used by the CHDS.

7.6 Sex of Parent and Life Course Outcomes

Chapter 5 investigated the association between the onset of parenthood and outcomes at age 40. This chapter examined outcomes over the following domains: family socio-economic well-being, education, household composition, psychosocial well-being, and mental health. For each of these domains, differences were assessed by gender.

Gender differences were observed for three life course outcomes. Fathers reported higher levels of material well-being and were more likely to report living in houses with more people per room, and mothers reported attaining higher levels of education than fathers. This latter finding applied to both younger and older parents. In comparison to previous research, these gender differences in educational attainment were unexpected. However, these findings are consistent with wider demographic trends over the past two decades towards greater female participation in higher education (Ministry for Women, 2012). Based on the findings here, there is no evidence of interactions between gender and early parenthood. When accounting for the childhood and adolescent factors and adult mediating processes (study 2 in Chapter 5), the gender difference observed in material well-being and educational attainment no longer remained. However, the gender difference in household crowding still remained, whereby fathers were more likely to live in households with more people than rooms, even when accounting for other factors. It seems likely this is simply a reflection of the higher proportion of single parent families amongst parenting mothers compared with parenting fathers. Jointly these findings suggest that not only were overall outcomes similar for mothers

and fathers in the cohort, but the absence of interactions also implies that the associations between early parenthood and later outcomes were similar for both sets of parents.

7.7 Māori and non-Māori Parents and Life Course Outcomes

When examining in Chapter 5 the association between the onset of parenthood and outcomes at age 40, additional analyses were conducted to assess any differences between Māori and non-Māori parents. Since previous research examining the association between the onset of parenthood and outcomes between Māori and non-Māori is scarce, this dissertation sought to address this gap in the literature. To understand differences between Māori and non-Māori in the onset of parenthood and outcomes, two aspects were explored. Firstly, research examined the differences between Māori and non-Māori in associations between the onset of parenthood and life course outcomes. Secondly, within the Māori cohort this research explored the role of cultural affiliation as both an explanatory factor for each outcome as well as an outcome itself. Each of these aspects will be discussed in further detail below.

Initially, differences between Māori and non-Māori were observed for three outcomes. Māori parents were less likely to own their home, they reported lower socio-economic status, and were less likely to have achieved educational qualifications. No differences were observed between Māori and non-Māori parents for any other outcomes assessed in Chapter 5. After accounting for adverse childhood factors and adult mediating processes, the initial differences in outcomes between Māori and non-Māori no longer remained. That is, the strength of the association between each outcome and the onset of parenthood did not appear to differ for Māori and non-Māori. There are two clear implications of these findings: (a) within this cohort, Māori and non-Māori share a diverse range of adverse childhood experiences and adult mediating processes that account for differences between early and delayed onset of parenthood; and (b) these common factors explain differences in the

association between early and delayed onset of parenthood and later life outcomes in the same way for both Māori and non-Māori.

Due to the role of cultural affiliation in the prediction of early parenthood, the final model for each of the outcomes was extended to include Māori cultural affiliation. In this analysis, the role of Māori cultural affiliation did not contribute to differences in outcomes associated with age of onset for parenthood. Despite the models being restricted to the Māori cohort and the subsequent reduction of power in the analysis, it can be suggested that Māori cultural affiliation was not related to outcomes for parents at age 40. That is, regardless of how engaged or disengaged Māori parents were with their culture or how embedded within Te Ao Māori, these did not appear to influence outcomes for younger parents when accounting for prior disadvantage. On the basis of this analysis, therefore, there is little evidence that interventions or policy recommendations dedicated to improving outcomes for young parents need to be specific to Māori cultural affiliation.

When examining Māori cultural affiliation as an outcome, younger parents reported greater affiliation to Māori culture than older parents. This difference was explained by early life course differences in cultural affiliation between the ages of 21 and 25 years. That is, younger parents reported greater cultural affiliation earlier in life, and this difference remained evident at age 40. As alluded to earlier, differences in Māori cultural affiliation may reflect differences not only in values regarding parenthood, but also different values attached to outcomes later in life. The role of Māori cultural affiliation over the life span in predicting outcomes is an area that requires further investigation. It would be beneficial for future research to address the role of cultural affiliation over the life span more deeply and comprehensively by incorporating a kaupapa Māori research approach.

7.8 The Onset of Parenthood and Life Course Outcomes

As previously summarised, there were no gender or Māori and non-Māori differences in the association between onset of parenthood and life course outcomes identified in Chapter 5. Instead, a selection of factors emerged that were relevant to parents, which will be discussed below.

Consistent with previous research, younger parents were worse off than older parents for each outcome domain, with small to moderate effect-size differences evident. Previous research examining family socio-economic well-being and education outcomes has also reported that those with an earlier onset of parenthood were less likely to own their own home (Mills et al., 2011; Moffitt, 2002), to have a lower socio-economic status, (Assini-Meytin & Green, 2015; Hofferth, 1984; Nisén et al., 2019; Williams et al., 1997; Zeck et al., 2007), lower family income (Boden et al., 2008; Hobcraft & Kiernan, 2001; Hofferth, 1984; Nisén et al., 2019), poorer material well-being (Geronimus & Korenman, 1992; Hobcraft & Kiernan, 2001; Hofferth , 1984) and lower rates of educational attainment (Assini-Meytin & Green, 2015; Boden et al., 2008; Card & Wise, 1978; Fergusson & Woodward, 2000; Kravdal, 1994). Regarding their household composition, younger parents have also been found to be less likely to be in a long-term relationship (Falci et al., 2010; Schmidt et al., 2012; Woodward et al., 2001) and more likely to experience greater household crowding (Archibald, 2004; Moffitt, 2002) than parents who delayed parenthood. In regard to psychosocial well-being and mental health, other studies have also reported that those who transitioned to parenthood earlier in life had less social support (Hudson et al., 2000), lower self-esteem (Archibald, 2004; Nomaguchi and Milkie, 2003), less life satisfaction (Mastekaasa,1994; Sigle-Rushton, 2005) and reported more mental health disorders (Boden et al., 2008; Bradley & Slade, 2011; Falci, et al., 2010; Hobcraft & Kiernan, 2001; Mirowsky & Ross, 2002; Williams et al., 1997) by the age of 40.

The observation of pervasive disadvantageous outcomes for young parents raises questions as to the origins of the observed differences and potential opportunities for prevention or intervention to limit the impacts on life course outcomes associated with early parenthood. Consideration of the origins of the observed outcome differences suggests three possible explanations, each of which was examined in this dissertation. First, the outcomes may reflect the effect of pre-existing childhood/family disadvantage and individual characteristics or behaviours that are associated with both an earlier onset of parenthood and adverse life course outcomes. To explore this possibility, a wide array of prior childhood, family and individual factors were taken into account, spanning the domains of socio-economic status, family functioning, exposure to childhood abuse, scholastic performance, and antisocial or precocious behaviours or characteristics during adolescence. Secondly, early parenthood may be associated with disadvantaged life course processes during early to mid-adulthood that may mediate outcomes later in life. To explore this possibility, an array of adulthood mediating factors were taken into account, spanning the domains of employment, assets, partner relationships, social support and mental health. Thirdly, once accounting for explanatory factors, the intention is to examine whether early onset of parenthood has a direct effect on later outcomes.

For most of the outcomes examined in this dissertation, statistical adjustment for prior family, social and individual disadvantage during childhood and adolescence explained the majority of the observed associations between early parenthood and later outcomes. These findings suggest that many of the apparent differences in adult outcomes between those who made an early or late transition to parenthood appear to reflect the effects of pre-existing disadvantageous childhood, family and individual characteristics associated with an early transition to parenthood, rather than the effects of the onset of parenthood per se. To a large extent the apparent disadvantages in outcomes associated with early parenthood appear to

reflect the indirect effects of prior life course factors and individual characteristics. These findings indicate that many early life course disadvantageous factors that are predictive of early parenthood are also predictive of later life course outcomes. While the specific explanatory factors varied slightly across the outcome domains, these factors included lower family sociodemographic status, greater family dysfunction, childhood abuse exposure, educational underperformance, individual personality characteristics, adolescent mental health, and antisocial and precocious adolescent behaviour.

For four outcomes, adjustment for prior social family and individual risk factors was insufficient to explain the observed associations between early parenthood and later outcomes. These outcomes were home ownership, gross family income, higher educational attainment, and steady, long-term relationship. For these outcomes, further analysis was conducted to explore the potential role of mediating processes and pathways in young adulthood. This analysis identified a range of relevant mediating factors that included occupational choice, accumulation of net assets, engagement in the workforce, social support, educational attainment by age 25, and having a partner who displays antisocial behaviours. Thus, early parenthood appears to be associated with a range of restrictions on life choices and opportunities in young adulthood that are themselves predictive of later adversity. Conversely, delayed parenthood is associated with a range of advantages. Specifically, parents who delay onset have greater opportunities to secure higher status employment and participate in the workforce to accumulate assets. Likewise, older parents may also have greater opportunity to make good partner choices, which can provide a form of support that may improve socio-economic and educational outcomes. They may also have stronger social support networks that may act to enhance existing relationships (Moffitt, 2002).

The major role played by prior adverse childhood and adolescent factors in explaining outcome differences between early and later parents reinforces the need for continued policy

development and interventions targeted at reducing existing social, financial, educational and related disadvantages in childhood. In the context of the present study, such interventions are likely to have a dual benefit: that of reducing the number of individuals making an early transition to parenthood as well as reducing the observed inequalities in longer term adult outcomes associated with early parenthood. Some examples of relevant policies or interventions that are already targeted interventions of previous or current governments in New Zealand have included: addressing child poverty and income support for low income families (e.g. Sole Parent Support, Working for Families Tax Credits; Ritchie et al., 2014), reducing child abuse (Ministry of Justice, 2020; Wynd, 2013) and improving the quality of parenting in high-needs families (Ministry of Health, 2015; Munford et al., 2007; Oranga Tamariki, 2019), targeting school retention and progression in tertiary education (New Zealand Productivity Commission, 2017; Pont et al., 2013; Scott, 2005), reducing adolescent risk-taking and antisocial behaviours (Carter et al., 2017; Inter-Agency Working Group, 2007). Furthermore, an example of the dual benefit of targeted approaches can be seen in the increasing emphasis on school retention and progression into tertiary education and reducing inequities over the past few decades (New Zealand Productivity Commission, 2017; Pont et al., 2013). There is good evidence that such processes are associated with longer term socio-economic benefits (New Zealand Productivity Commission, 2017). It would be of interest to examine how these changes are reflected in the transition to early parenthood and associated disadvantages amongst a more recent generation of young New Zealanders than the CHDS cohort.

Based on the findings identifying adulthood mediating factors, a range of opportunities for intervention can be identified: interventions focused on improving socio-economic and educational outcomes for young parents could be based on a broader provision of support (Rawiri, 2007; Stevenson et al., 1999; Wolkow and Ferguson, 2001; Zeck et al.,

2007). This could include childcare support to allow young parents to participate in education or the workforce. It could also include programmes or policy incentives that provide support to streamline the transition of young parents into education, training, or directly into the workforce. An example of an organisation that provides useful services is the Association of Teen Parent Educators New Zealand, which provides teen parent schools and early childhood centres throughout New Zealand. Policy interventions that were not available to young parents in the CHDS cohort include recent advances to allow for up to 20 hours per week of free childcare and a childcare subsidy (New Zealand Government, 2020a) as well as a young parent payment (New Zealand Government, 2020b).

In all cases, when the effects of the mediating factors were taken into account, in addition to the antecedent social family and individual behavioural and characteristic factors, they were sufficient to explain all of the observed associations between early parenthood and later outcomes. That is, there was no evidence of an independent direct effect of early parenthood on later outcomes. The clear implication of this result is that early parenthood, in and of itself, is not a risk factor for later adverse outcomes. Rather, it is the combination of disadvantage during childhood and adolescence, as well as limited life choices and opportunities in young adulthood that contribute to more adverse outcomes for young parents.

7.9 Limitation and Strengths of Current Research

As with all research, the findings presented in this dissertation should be considered in light of both their strengths and limitations. The longitudinal design of the CHDS has an inherent ability to address the limitations of cross-sectional research that dominates the parenthood literature (Hofferth, 1984; McLanahan & Bumpass, 1988; Wellings et al., 1999). For example, by collecting data from birth to the age of 40 years, the CHDS provided the opportunity to examine a range of prospectively collected measures that not only predict the

onset of parenthood but are also associated with differences in outcomes later in life. These prospective measures span several domains including socio-economic well-being, childhood behaviour, education, family factors, adolescent functioning, and individual traits. Another key strength of this dissertation lies in the use of the longitudinal data collected by the CHDS. The large sample size and collection of data on mothers and fathers as well as Māori and non-Māori provided the opportunity to model gender and ethnic differences within this dissertation to reveal novel findings in this field. Therefore, the CHDS data provided the opportunity to not only address the limitations of existing literature, but also address the gaps within literature to report new findings.

Despite the many advantages of using CHDS data, there are still limitations that should be taken into consideration when interpreting the findings. Firstly, the research for this dissertation examined a particular birth cohort, located in New Zealand, at a particular point in time. It is likely that the results of the research presented reflect to some extent the social and economic conditions in New Zealand during the life course of the cohort, and in some cases may not directly generalise to other populations, in other times at other locations. For example, with an increase in accessibility and advancement of technology, young parents in the 21st century have greater opportunities to continue their education through different media (e.g. online courses, distance learning). Likewise, there are different forms of employment that were not available for the young parents in the CHDS cohort (e.g. streamer, vlogger, podcast producer, entrepreneurial gamers, Uber drivers, and virtual assistants). Due to societal changes in advancement in technology, young parents of the 21st century have a greater range of opportunity and may not experience the same disadvantages or barriers to continuing education and employment as previous generations. As this study was not able to account for these types of changes within contemporary society, the impact of societal

changes on the underlying processing associated with differential outcomes between early and delayed parenthood is unknown.

As this dissertation used data from an existing longitudinal study, and although a broad array of domains were assessed in the CHDS, the current research was constrained by the methods and data already collected. As a result, there are certain constructs not assessed in the CHDS that may have contributed to furthering the aims of this dissertation had they been assessed. For example, it may have been useful to have a measure reflecting career, financial and parental goals and aspirations throughout the life course, to assess if either goals or aspirations affect the onset of parenthood and socio-economic outcomes. The second is a measure of the participants' perspectives on the timing of parenthood and becoming a parent, which would provide context as to why some people choose an early or delayed parenthood. Likewise, getting parents' perspectives on becoming a parent at a certain age may highlight the impact parenthood has had on their life both positively and negatively. Finally, it would have been beneficial to this dissertation, if there had been qualitative measures to assess the participants' views of parenthood, and the potential influence of Māori culture views towards parenthood. If another longitudinal study were to be created, these measures would be of benefit to future parenthood research.

While the assessments in the CHDS are to be commended for including assessment of Māori ethnicity and cultural factors, they have limitations, in large part due to the timing and nature of the study. The CHDS was initially developed in the 1970s when there was not a strong emphasis on Māori centred research within New Zealand. As a result, there is a lack of Māori specific measures across the life span with the age 21, 25 and 40 assessments, being the only ages where Māori cultural measures were assessed. Therefore, there are two main limitations when examining the CHDS Māori cohort in this dissertation. Firstly, the difficulty in applying a Māori methodological approach, the applicability of the Māori cultural

affiliation variables and the restriction of models to the Māori cohort when accounting for Māori cultural affiliation.

As discussed in the literature review (see Chapter 2, section 2.4.4), kaupapa Māori and Māori centred research are the ideal standards with which to conduct research on Māori. This is because the approaches incorporate Māori perspectives in each aspect of the design to ensure the research is addressing issues in Māori communities. Due to the CHDS having limited involvement of Māori researchers in the design of the CHDS assessments neither a kaupapa Māori nor a Māori centred approach could be applied within this dissertation. Instead, the research conducted in this dissertation was constrained to applying a Māori perspective when analysing and interpreting the results as well as drawing conclusions. This is a limitation that could be addressed in future research, by including Māori researchers and incorporating specific measures of Māori culture.

Another limitation regarding the Māori measures collected by the CHDS is the applicability of the Māori cultural affiliation measure for this dissertation. The Māori cultural measures used in this dissertation were originally developed through a collaboration between the CHDS and the Ngāi Tahu Māori Health Research Unit (NTMHRU). The initial questionnaire was designed to assess Māori ethnicity and participation in Māori specific activities (Broughton et al., 2000). This provided the opportunity to assess the role of Māori ethnic identity and Māori cultural affiliation in the onset of parenthood and life course outcomes. However, this data is not without its limitations. The Māori cultural items were not designed with this dissertation in mind, therefore may not reflect aspects of Māori culture that could be associated with the onset of parenthood. Examples of these could include cultural views on the timing of parenthood and its value in the continuation of whakapapa.

Furthermore, when analysing the role of Māori cultural affiliation, it should be noted that the models were restricted to the Māori cohort. As a result, this limited the complexity of

the models that could be fitted due to the reduced sample size and subsequent loss of analytic power. Therefore, due to the limited models that could be examined as well as the design of the Māori cultural affiliation measure, this dissertation was unable to identify which specific aspects or facets of Māori cultural affiliation (e.g. level of engagement with Māori content, proficiency in mātauranga Māori or connection with Te Ao Māori) were associated with earlier onset of parenthood. It would be beneficial, therefore, for future research to consider using a Māori centred approach and including relevant Māori cultural measures.

Due to how the Māori cohort in this dissertation were selected, there are possible implications for the findings of this study (Kukutai, 2004). The definitions used to define Māori, could impact whether the group truly share similar attributes regarding demographic behaviour, education, employment, or cultral engagement. Likewise, grouping Māori by sole, mixed or of descent when considering types of support or interventions, can impact who would be eligible to be considered. Thus, the implications of how Māori are defined and grouped within research should be considered. A sensitivity analysis was conducted (see Appendix G) to assess whether the classification to include Māori of decent would be substantially different to a classification were Māori only by descent were excluded from analyses. Where comparing the baseline models (Table 9 versus Table G1), the coefficients for the onset of parenthood for Māori in the alternative model (Table G1) were larger, indicating that for an alternative classification, the early onset rate of parenthood would have been greater for Māori. This initial difference is only marginal, and when accounting for covariates in the proceeding models no substantive difference were identified in either model parameters or conclusions. Therefore, the classification used to define the CHDS Māori cohort by ethnicity or to include Māori of descent, had no substantial impact on the findings for this dissertation. The lack of substantial difference may be a result of the CHDS cohort, therefore future research should be considerate of the potential implications of including or

excluding Māori by descent when classifying Māori cohorts (Kukutai, 2004; Houkamau & Sibley, 2018; Robson & Reid, 2001).

When considering the CHDS sample, another limitation to consider is attrition bias, because it is commonly observed in longitudinal studies and the present study is no exception. There was evidence of differential sample attrition reflecting under-representation of children from socio-economically disadvantaged backgrounds in the analysis sample for the onset of parenthood, raising the issue of the extent to which such bias may be a threat to the study validity. However, extensive previous analyses of CHDS data suggest that while attrition bias may affect the precision of statistical parameter estimates (e.g. the size of confidence intervals), in general it does not result in biased estimates of association (Fergusson, et al., 1997; Fergusson et al., 2013; McLeod et al., 2014; Silins et al., 2014). In addition, emerging evidence from other longitudinal and cohort studies tends to reinforce the conclusion that attrition bias is more of a theoretical than an actual threat to study validity (Gustavson et al., 2012; Saiepour et al., 2019). This evidence would tend to suggest that any effects of sample attrition in the present study are likely to be minimal.

When considering construct validity, it could be suggested that the instrumentation used in the CHDS is somewhat piecemeal and that it would have been better to base prevalence estimates of mental health disorders, for example, on the administration of a standardised interview designed specifically for the DSM-III-R (American Psychiatric Association, 1987). The nature of the instrumentation in the CHDS can be explained in three ways. First, to ensure comparability with the findings reported by McGee et al. (1990), the instrumentation used was generally comparable with the DMHDS research. Second, the present research was conducted in the context of a much wider longitudinal study in which it was necessary to have general-purpose instruments that could be used for DSM-III-R and DSM-IV criteria and other purposes (American Psychiatric Association, 1994). Third, as

noted above, versions of the DISC (Costello et al., 1982) suitable for assessing DSM-III-R criteria were not available to the CHDS at the time the research was planned, requiring custom written items to supplement existing instrumentation so that aspects of DSM-III-R criteria not covered by the instruments were met. By using an amalgamation of measures, it was possible to assign children to DSM-III-R diagnostic categories using the parental and child report data for ages 15 and 16. At age 18, DSM-IV categories were assigned using the self-report data gathered at this age. A full description of the construction of these diagnostic categories and the prevalence of these disorders within the cohort at age 15 years has been provided previously by Fergusson et al. (1993).

Finally, it is noted that within the literature the criteria used to define early and delayed onset groups for parents varies markedly (see Chapter 1, section 1.1.3). Within this dissertation an Epoch approach was used to categorise early onset of parenthood between the ages of 16 to 26 years, and delayed onset as 27 years or older. These ages are relatively consistent with literature, although 26 years is near the upper age for "young" parents in the literature (Dariotis et al., 2011; Lee & Gramotnev, 2006; Sigle-Rushton, 2005). Despite two Epochs allowing the best sample sizes for power and model parsimony, parents who may have been considered "on-time" are not defined and were most probably included in the delayed onset of parenthood group (Cooney et al., 1993). This limits the ability to identify whether on-time and delayed onset of parenthood share the same predictive factors.

7.10 Future Research

Based on the findings and limitations in the current research, the following suggestions are being made for future research. Firstly, the assessment of attitudes towards the onset of parenthood and family formation was beyond the scope of this dissertation as this construct was not measured in the CHDS. This remains a potentially fruitful area for further investigation to understand which aspects of cultural affiliation or lack thereof contribute to different pathways towards parenthood. Areas to consider investigating could be strength of

kinship ties with Māori whānau, the role of Māori identity, importance in the continuation of whakapapa, engagement in Te Ao Māori (the Māori world), and proficiency in mātauranga Māori.

Secondly, as previously mentioned over the past decade, new policy and programmes have come into effect that provide support for young parents. In order to understand the effect of current programmes and policies, further research is needed to explore the implications of childcare availability and government financial assistance for limiting future socio-economic and related disparities for current young parents.

Thirdly, when conducting research on Māori communities it is important for future research to utilise either a kaupapa Māori or Māori centred approach (Forster, 2003). This would ensure that the development of any future research regarding Māori parents is cognizant of Māori culture, Māori knowledge and lived realities (Forster, 2003). As a result, this will ensure future research conducted on Māori communities is also of use to Māori communities. Furthermore, by developing studies that incorporate Māori culture and a Māori world view in the design and application it would provide an opportunity to explore social and cultural views, aspirations, and acceptability of the timing of parenthood.

Fourthly, future research should consider the use of qualitative and quantitative approaches to separate the effect of Māori ethnic, cultural and identity in parenthood and outcomes. This could be done by developing new measures that could include cultural views and attitudes towards childbearing; attitudes towards family, whānau, and kinship group support systems; or the degree of acceptability of parenting at younger ages. Likewise, future research could use or extend the 40-item test of Māori knowledge (Thomas, 1988), Te Hou Nuku Roa (Durie, 1995) or the Multidimensional Model of Māori Identity and Cultural Engagement (MMM-ICE2; Houkamau & Sibley, 2015). By developing Māori measures relevant to parenthood it could provide future studies an opportunity to examine which

aspects of Māori culture, knowledge or values, or lack thereof, are associated with the onset of parenthood.

Fifthly, within this dissertation a two-Epoch approach was used to run analyses. This limits the ability to identify whether on-time and delayed parenthood share the same predictive factors. Therefore, future research could address this limitation using a larger sample to ensure analyses can be conducted on early, on-time and delayed onset of parenthood groups.

Finally, another aspect of future research could focus on the definition of parenthood, which varies throughout literature. Future research could explore whether variations in the parenthood criteria affect outcomes. These variations could include wanted compared to unwanted pregnancy or parenthood; planned and unplanned pregnancy; parents were involved or not involved with childrearing; residential and non-residential parents; and biological compared with non-biological parents (e.g. parents with stepchildren or adopted children). The benefit of this future research would be to identify whether the effect of the criteria used to define parenthood has an effect on outcome measures.

7.11 Conclusion

To conclude, it is evident that the wide range of factors that influence the timing of parenthood are multifaceted in nature. They reflect childhood socio-economic and psychosocial disadvantage, individual characteristics and risk-taking behaviours, engagement in education, workforce participation and partner formation. Over time, the strong influences of prior childhood and adolescent disadvantage on early parenthood is replaced by a more planned approach to parenthood in relation to career and employment pathways and stable partnership formation. While early parenthood is associated with wide-ranging disadvantages in adult functional outcomes in mid-life, these are a reflection of the correlated influences of

prior family, social and individual factors earlier in life and the mediating processes in young adulthood, rather than the direct consequent of early parenthood itself.

As reflected in the title of this dissertation, a key component of the analysis was the focus on gender and ethnic differences. Perhaps the most interesting aspect of the analysis is the relevant absence of specific gender or ethnic influences in factors predicting the onset of parenthood or life course outcomes. The only substantive differences were in the higher rates of early parenthood for females and Māori. These differences aside, the general impression was of similarity rather than difference. In particular, modelling of the onset of parenthood showed that the pattern of risk factor associations predicting onset of parenthood was the same for both sexes, and for Māori and non-Māori. Similarly, the associations between early parenthood and later life course outcomes were similar for Māori and non-Māori as well as for mothers and fathers. Thus, the observation of gender or Māori ethnic differences in the onset rate of parenthood was not reflected in either the nature of risk factor associations or the apparent consequences associated with early parenthood for mid-life functional outcomes. Finally, modelling of the onset of parenthood within the Māori cohort showed that the role of Māori cultural affiliation differed when predicting early and delayed onset of parenthood; whereas, with the exception of the Māori cultural affiliation outcome during midlife, the level of Māori cultural affiliation earlier in life was not associated with any of the apparent consequences associated with early parenthood for midlife functional outcomes.

The research conducted in this dissertation indicates that there are various pathways towards parenthood, yet the pathways are the same for men and women as they are for Māori and non-Māori. Therefore, while considering different cultural views, future research and interventions should focus on supporting parents to achieve the best outcomes for them and their children regardless of the timing of parenthood.

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Appendix

Appendix A: Attrition Rate of CHDS for each Study

Table A1:
Rates (%) inclusion in analysis sample for study 1 (N = 1055) by family sociodemographic characteristics at birth

Measure	N	% (N) Individuals in analysis sample
Sex at Birth		
Female	630	84.76 (534)
Male	635	82.05 (521)
		$\chi^2(1) = 1.68, p = .19$
Ethnicity		
Non-Māori	1123	934 (83.17)
Māori	142	121 (85.21)
		$\chi^2(1) = 0.38, p = .54$
Born into two parent family		
Yes	1167	988 (84.66)
No	98	67 (68.37)
		$\chi^2(1) = 17.34, p < .001$
Family Socioeconomic Status (birth)		
Professional, managerial	255	217 (85.10)
Clerical, technical, skilled	668	574 (85.93)
Semiskilled, unskilled, unemployed	342	264 (77.19)
		$\chi^2(2) = 13.13, p < .01$
Mothers age at birth		
30+	260	215 (80.62)
25-29	489	424 (86.71)
<25	516	416 (80.62)
		$\chi^2(2) = 6.84, p = .03$
Maternal Education		
Tertiary qualification	235	211 (89.79)
High School qualification	385	319 (82.86)
No qualification	645	525 (81.40)
		$\chi^2(2) = 8.88, p = .01$
Paternal Education		
Tertiary qualification	221	195 (88.24)
High School qualification	406	337 (83.00)
No qualification	638	523 (81.97)
		$\chi^2(2) = 4.71, p = .10$

Table A2:

Rates (%) inclusion in analysis sample for study 2 (N = 693) by family sociodemographic background and individual characteristics amongst the sample who had become parents by age 40 (N=1055)

Measure	N	% (N) Individuals in analysis sample
Sex at Birth		
Female	630	371 (58.89)
Male	635	322 (50.71)
		$\chi^2(1) = 8.54, p < .01$
Ethnicity		
Non-Māori	1123	614 (54.67)
Māori	142	79 (55.63)
		$\chi^2(1) = 0.05, p = .83$
Born into two parent family		
Yes	1167	648 (55.53)
No	98	45 (45.92)
		$\chi^2(1) = 3.37, p = .07$
Family Socioeconomic Status (birth)		
Professional, managerial	255	148 (58.04)
Clerical, technical, skilled	668	375 (56.14)
Semiskilled, unskilled, unemployed	342	170 (49.71)
		$\chi^2(2) = 5.14, p = .08$
Mothers age at birth		
30+	260	135 (51.92)
25-29	489	284 (58.08)
<25	516	274 (53.10)
		$\chi^2(2) = 3.59, p = .16$
Maternal Education		
Tertiary qualification	235	135 (57.45)
High School qualification	385	211 (54.81)
No qualification	645	347 (53.80)
		$\chi^2(2) = 0.93, p = .63$
Paternal Education		
Tertiary qualification	221	135 (61.09)
High School qualification	406	209 (51.48)
No qualification	638	349 (54.70)
		$\chi^2(2) = 5.34, p = .07$

Appendix B: Mental Health and Substance Use Disorder Time Dynamic Variables

This appendix provides a detailed description of the derivation of the time dynamic measures of mental health and substance use disorders used in this thesis. At each assessment from age 15-35 years, detailed information was obtained on aspects of the individual's mental health and psychosocial adjustment since the previous assessment. When participants were 15 and 16 years old, symptoms of psychiatric and behavioural disturbances were assessed using an interview approach predominately based on the work of McGee et al., (1990) in the Dunedin Multidisciplinary Health and Development Study (DMHDS). The DMHDS is a parallel study of another cohort of New Zealand children born in Dunedin. This approach was taken to ensure comparability between the findings of the CHDS and the DMHDS. Interviews were conducted with both the child and the parent at different sites (the parent was interviewed at home and the participant at school) by different interviewers. For each participant, parental consent to interview the child was obtained. The interviews utilised a combination of standardised assessed instruments (see below) and custom written survey items to assemble a series of items that were suitable for classifying adolescents according to DSM-III-R (American Psychiatric Association, 1987) symptom criteria for a range of disorders.

Between the ages of 18 and 35 years old, participants were questioned about their psychiatric symptoms, using an interview that combined relevant components of the Comprehensive International Diagnostic Interview (CIDI) (World Health Organization, 1993) with custom written survey items to classify participants according to the DSM-IV (American Psychiatric Association, 2000) symptom criteria for a similar range of disorders. The specific measures used in this study are described in detail below. Further details on the assessment, classification and prevalence of mental health and substance use disorders in the cohort can

be found in a large number of CHDS publications (Fergusson et al., 1993; Fergusson et al., 1996; Fergusson et al., 2008; Fergusson et al., 2012; McLeod et al., 2016).

Major Depression

Depression DSM-III-R. At ages 15 and 16 years depressive symptoms were assessed using the abbreviated self- and parent-report versions of the Diagnostic Interview Schedule for Children (DISC) (Costello et al., 1982) used by McGee et al. (1990). Because the DISC version suitable for assessing DSM-III-R major depression criteria was not available at the time this research was planned, the items were supplemented by items from the Diagnostic Interview Schedule (DIS; Robins et al., 1981) to address the DSM-III-R (American Psychiatric Association, 1987) depression criteria that were not covered in the original version of the instruments, as described by Fergusson et al., (1993).

The DSM-III-R symptom criteria for major depression include:

i. Depressed mood (or can be irritable mood in children and adolescents) most of the day, every day
ii. Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day
iii. Significant weight loss or weight gain when not dieting (e.g. more than 5% of body weight in a month), or decrease or increase in appetite nearly every day
iv. Insomnia or hypersomnia nearly every day
v. Psychomotor agitation or retardation nearly every day
vi. Fatigue or loss of energy nearly everyday
vii. Feelings of worthlessness or excessive and inappropriate guilt nearly every day
viii. Diminished ability to think or concentrate, or indecisiveness, nearly every day

ix. Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide

To meet DSM-III-R (American Psychiatric Association, 1987) criteria for a major depressive episode an individual must experience at least five of the above symptoms during the same two-week period, with at least one of the symptoms being either 1. Depressed mood, or 2. Loss of interest or pleasure. Participants responded to 15 items (child report) and their parent responded to 16 items (parent report) that assessed each of the DSM criteria in one or more ways. Items were coded on a three-point scale coded: 1 = *No*, 2 = *Yes, perhaps*, and 3 = *Yes, definitely,* with a *Yes definitely* response taken to indicate the participant met diagnostic criteria for that symptom. Separate questioning was conducted to assess both current (past month) symptomatology and depressive symptoms over the previous 12 months. Participants were classified as having major depression at the ages of 15 and 16 if, based on either parent- or self-report they met DSM-III-R (American Psychiatric Association, 1987) symptom criteria for a major depressive episode at the time of the interview or over the 12 months prior to the interview. The use of a combined parent/self-report measure has previously been shown to provide an optimal method of classification of disorder for these data (Fergusson, et al., 1993). For the purposes of this study, the data were combined over the two assessments to construct a dichotomous measure reflecting whether the participant met diagnostic criteria for major depression at any time over the two-year interval from age 14-16 years (0 = *No. did not meet criteria* and 1 = *Yes, did meet criteria for major depression*). For this sample, 12.86% were defined as having major depression between 14-16 years old.

Depression DSM-IV. At ages 18, 21, 25, 30 and 35 years depression was assessed using CIDI (World Health Organization, 1993) items to assess depressive symptoms, supplemented by custom written items to assessment impairment of functioning, and

classified according to DSM-IV symptom criteria. DSM-IV (American Psychiatric Association, 2000) applies the same symptom criteria as above for the classification of a major depressive episode (at least five symptoms present in the same two week period with at least one of the symptoms being either 1. Depressed mood, or 2. Loss of interest or pleasure). The symptoms must cause clinically significant distress or impairment in functioning and must not due to substance use, a medical condition, or bereavement.

Participants responded to a series of 24 dichotomous (Yes/No) items that assessed each of the DSM-IV depressive symptom criteria in one or more ways. Separate questioning was conducted to assess depressive symptoms occurring in the past 4 weeks, the past 12 months and the remainder of the time interval since the previous assessment. Participants who reported a depressive episode were further questioned using custom written items to assess the extent to which this impacted on a series of seven domains of life course functioning (their education; their employment; relationships with friends; relationships with family; relationships with their partner; hobbies or interests; and other aspects of their life). Responses were coded on a three-point scale (1 = *Not at all*, 2 = *A little,* and 3 = *A great deal*), with an *A great deal* response in any domain taken to indicate significant impairment. For the purposes of this study, participants who met diagnostic criteria for a major depressive episode at any time during the interview period since the previous assessment were classified as having major depression during that interval: age 16-18 (22.07%), 18-21 (23.54 %), 21-25 (21.93%), 25-30 (21.18%) and 30-35 (18.61%).

Anxiety Disorder

Anxiety Disorder DSM-III-R. At ages 15 and 16, participants were assessed on DSM-III-R symptom criteria for a range of anxiety disorders (overanxious disorder, social phobia and simple phobia) using the abbreviated version of the DISC described by McGee et al. (1990). Questioning was supplemented by items from the DIS (Robins et al., 1981) for the

assessment of generalised anxiety disorder (GAD), since the DISC version suitable for assessing DSM-III-R criteria for GAD was not available at the time the research was planned (see Fergusson et al., 1993). A parallel interview was conducted the child's parents.

The DSM-III-R (American Psychiatric Association, 1987) criteria for each disorder are summarised below, along with the ways in which these criteria were applied to the CHDS:

Generalised Anxiety Disorder

The DSM-III-R criteria for Generalised Anxiety Disorder include:

a. Unrealistic or excessive anxiety or worry (apprehensive expectation about two or more life circumstances, e.g. worry about finances (for no good reason), for a period of six months or longer, during which the person has been bothered more days than not by these concerns. In children and adolescents this may take the form of anxiety and worry about academic, athletic and social performance.
b. If another Axis I disorder is present, the focus of anxiety and worry in a) is unrelated to it
c. The disturbance does not only occur during the course of a mood disorder or a psychotic disorder
d. At least 6 of the following 18 symptoms are present when anxious:
    i. Trembling
    ii. Muscle tension, aches or soreness
    iii. Restlessness
    iv. Easy fatigability
    v. Shortness of breath or smothering sensations
    vi. Palpitations or accelerated heart rate
    vii. Sweating or cold clammy hands

viii. Dry mouth

ix. Dizziness or light headedness

x. Nausea, diarrhoea or other abdominal distress

xi. Flushes (hot flashes)

xii. Frequent urination

xiii. Trouble swallowing or 'lump in throat'

xiv. Feeling keyed up or on edge

xv. Exaggerated startle response

xvi. Difficulty concentrating or mind going blank

xvii. Trouble falling or staying asleep

xviii. Irritability

e. It cannot be established that an organic factor initiated or maintained the disturbance

For the purposes of the CHDS, only the key criteria a. and c. were required for the individual to meet diagnostic criteria.

Overanxious Disorder

The DSM-III-R criteria for overanxious disorder include:

i. Excessive or unrealistic worry about future events

ii. Excessive or unrealistic concern about the appropriateness of past behaviour

iii. Excessive or unrealistic concern about competence in one or more areas (e.g. athletic, social)

iv. Somatic complaints, such as headaches or stomach aches, for which no physical basis can be established

v. Marked self-consciousness

vi. Excessive need for reassurance about a variety of concerns

vii. Marked feelings of tension or inability to relax

To meet diagnostic criteria the individual must have experienced excessive or unrealistic anxiety or worry for six months or longer as indicated by the frequent occurrence of at least four of the above criteria.

Simple Phobia

The DSM-III-R criteria for simple phobia include:

a. A persistent fear of a circumscribed stimulus (object or situation) other than fear of having a panic attack (as in panic disorder) or of humiliation or embarrassment in certain social situations (as in social phobia)
b. During some phase of the disturbance, exposure to the stimulus or stimuli almost invariably provoked an immediate anxiety response
c. The object or situation is avoided or endured with intense anxiety
d. The fear or the avoidant behaviour significantly interferes with the person's normal routine or with usual social activities or relationships with others, or there is marked distress about having the fear
e. The person recognises that his or her fear is excessive or unreasonable
f. The phobic stimulus is unrelated to the content of the obsessions of obsessive-compulsive disorder or the trauma of post-traumatic stress disorder

Since the CHDS did not attempt to assess obsessive-compulsive or post-traumatic stress disorder criterion f. was ignored in deriving the classification of disorder

Social Phobia

The DSM-III-R criteria for social phobia include:

a. A persistent fear of one or more situations in which the person is exposed to possible scrutiny by others and fears that he or she may do something or act in a way that will be humiliating or embarrassing
b. If an Axis III or another Axis I disorder is present, the fear in A. is unrelated to it, e.g., the fear of having a panic attack (panic disorder)
c. During some phase of the disturbance, exposure to the specific phobic stimulus or stimuli almost invariably provokes an immediate anxiety response
d. The phobic situation(s) is avoided, or endured with intense anxiety
e. The avoidant behaviour interferes with occupational functioning or with usual social activities or relationships with others, or there is a marked distress about having the fear
f. The person recognises that his or her fear is excessive or unreasonable
g. If the person is under 18, the disturbance does not meet criteria for avoidant disorder of childhood or adolescence

Since the CHDS did not assess avoidant disorder, criterion g. was ignored in deriving the classification of disorder.

The interview questions assessing the above symptom criteria comprised a total of 61 items for the child self-report and the same for the parental report. The questions included the following: (1) items concerning the occurrence of excessive worries or anxieties in the previous 12 months relevant to the diagnosis of GAD (eg worries about school, home life, money or finances, health, physical appearance, or life in general) and the duration of those worries; and the experience (Yes/No) of each of the 18 specific GAD anxiety symptoms in the context of those worries; (2) items assessing the occurrence of the specific criteria for overanxious disorder in the previous 12 months and the duration of each symptom; (3) items

assessing the extent of phobic response to a range of common phobic stimuli including both social (eg speaking in front of others, meeting new people, eating in front of others) and specific object/situational stimuli (eg spiders, bugs or other animals, heights, storms, the dark, being in water, bridges, being in a crowd, etc); item responses were coded on a three-point scale (1 = *Not at all*, 2 = *Somewhat*, and 3 = *A great deal*) with an *A great deal* response taken to indicate a relevant phobia; (4) items assessing the extent to which the identified phobias caused problems for the child, prevented them from doing things that they wanted to do, and the extent to which the fear was recognized as being excessive or unreasonable. Symptom reports were supplemented by recording verbatim comment on the way(s) in which each recorded phobia impacted on the individual's daily life.

For each disorder, participants were classified as having the disorder in a given interview period if they met diagnostic criteria for the disorder on the basis of either self- or parent-report. For the purposes of the current study the disorder classifications were combined over informants and across interview periods to provide a single dichotomous measure reflecting whether the participant met criteria for any anxiety disorder over the period from age 14-16 years. For this sample, 28.53% were classified as having an anxiety disorder over this period.

Anxiety Disorder DSM-IV

At interview ages 18, 21, 25, 30, 35 years old, participants were interviewed to assess their experience of anxiety disorders since the previous assessment. Interviews were conducted using the relevant components of the CIDI (World Health Organization, 1993) supplemented by custom written items to assess DSM-IV diagnostic criteria for the following disorders: generalised anxiety disorder, panic disorder, agoraphobia, specific phobia and social phobia. The DSM-IV (American Psychiatric Association, 2000) criteria for each

disorder are summarised below, along with the ways in which these criteria were applied to the CHDS.

Generalised Anxiety Disorder (GAD)

The DSM-IV criteria for generalised anxiety disorder include:

a. Excessive anxiety and worry (apprehensive expectation), occurring more days than not for at least 6 months, about a number of events or activities (such as work or school performance).
b. The person finds it difficult to control the worry
c. The anxiety and worry are associated with at least three (or more) of the following six symptoms (with at least some symptoms present for more days than not for the past 6 months)
    i. Restlessness or feeling keyed up or on edge
    ii. Being easily fatigued
    iii. Difficulty concentrating or mind going blank
    iv. Irritability
    v. Muscle tension
    vi. Sleep disturbance
d. The focus of the anxiety or worry is not confined to features of an Axis I disorder (e.g., the anxiety is not about having a panic attack (as in panic disorder)
e. The anxiety, worry or physical symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning
f. The symptoms should not be due to substance use, a medical condition or occur exclusively during a mood disorder, a psychotic disorder or a pervasive developmental disorder.

For the CHDS, classification of disorder was based primarily on the first five criteria since the research interview could not cover all possible exclusion criteria.

Panic Disorder

The DSM-IV criteria for panic disorder include:

a. Recurrent panic attacks, where a panic attack is defined as a discrete period of intense fear or discomfort that is accompanied by at least 4 of 13 somatic or cognitive symptoms that develop abruptly and reach a peak within 10 minutes. These symptoms include
    i. Palpitations, pounding heart, or accelerated heart rate
    ii. Sweating
    iii. Trembling or shaking
    iv. Sensations of shortness of breath or smothering
    v. Feeling of choking
    vi. Chest pain or discomfort
    vii. Nausea or abdominal distress
    viii. Feeling dizzy, unsteady, lightheaded, or faint
    ix. Derealisation (feelings of unreality) or depersonalization (being detached from oneself)
    x. Fear of losing control or going crazy
    xi. Fear of dying
    xii. Paresthesias (numbness or tingling sensations)
    xiii. Chills or hot flushes
b. At least one of the attacks has been followed by 1 month (or more) of one (or more) of the following:
    i. Persistent concern about having additional attacks

ii. Worry about the implications of the attack or its consequences (e.g., losing control, having a heart attack)

iii. A significant change in behaviour related to the attacks

c. The panic attacks are not due to substance use or a medical condition and are not better accounted for by another mental disorder.

For the purposes of the CHDS classification of disorder was based primarily on criteria a. and b.; criterion c. was considered only in relation to other disorders assessed as part of the research interview. Panic disorder was classified either with or without agoraphobia (see below).

Agoraphobia

The DSM-IV criteria for agoraphobia include:

a. Anxiety about being in places or situations from which escape might be difficult (or embarrassing), or in which help may not be available in the event of having an unexpected or situationally predisposed panic attack or panic like symptoms. Fears typically involve characteristic clusters of situations that include being outside the home alone; being in a crowd or standing in a line; being on a bridge; and traveling in a bus, train or automobile

b. The situations are avoided (e.g. travel is restricted) or else are endured with marked distress or with anxiety about having a panic attack or panic-like symptoms, or require the presence of a companion.

c. The anxiety or phobic avoidance is not better accounted for by another mental disorder

The CHDS classification of disorder was based primarily on criteria a. and b.; criterion c. was considered only in relation to other disorders assessed as part of the research interview.

Specific Phobia

The DSM-IV criteria for specific phobia include:

a. A marked and persistent fear that is excessive or unreasonable, cued by the presence or anticipation of a specific object or stimulus (e.g., flying or animals)
b. Exposure to the phobic stimulus almost invariably provokes an immediate anxiety response, which may take the form of a situationally bound or situationally predisposed panic attack
c. The person recognises that the fear is excessive or unreasonable
d. The phobic situation(s) is avoided or else is endured with intense anxiety or distress
e. The avoidance, anxious anticipation or distress in the feared situation(s) interferes significantly with the persons normal routine, occupational (or academic) functioning, or social activities or relationships, or there is marked distress about having the phobia
f. The anxiety, phobic avoidance or panic attacks are not better accounted for by another mental disorder

The CHDS classification of disorder was based primarily on criteria a. to e.; criterion f. was considered only in relation to other disorders assessed as part of the research interview.

Social Phobia

The DSM-IV criteria for social phobia are the same as those of specific phobia, however rather than the stimulus being a particular object or situation (e.g., flying, heights, spiders), the individual instead has a marked or persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar

people or to possible scrutiny by others (e.g., speaking in public, taking part in a meeting, going to a party). The individual fears that she or he will act in a way or show anxiety symptoms that will be humiliating or embarrassing. The symptoms must not be due to the effects of substances, must not be due to or in relation to a medical condition, and must not be better accounted for by another mental disorder. Again, the CHDS classification of disorder was based primarily on criteria a. to e.; criterion f. was considered only in relation to other disorders assessed as part of the research interview.

The interview component for the assessment of anxiety disorders comprised between 109 items (age 18) and 124 items (age 35) and included the following components:

For GAD, questioning included (1) a screening item as to whether the individual had experienced a period of intense anxiety or worry at any time since the previous assessment, and the duration in months of these worries; (2) detailed questions on the source/nature of the worries experienced (eg education/study, employment, relationships, money troubles, physical appearance, health, future, etc) and the severity of worry/anxiety in relation to each source. Severity was coded on a three-point scale (1 = *Not at all*, 2 = *A little*, and 3 = *A great deal)* with, an '*A great deal*' response on more than one domain taken to indicate worry/anxiety relevant to the diagnostic criterion. (3) questioning as to whether the individual felt the worries were about things that were not really serious or unlikely to happen (coded on the same three-point scale); (4) a series of dichotomous (Yes/No) items to assess the experience of the six anxiety symptoms relevant to criterion c.; (5) items to assess the extent of impairment of functioning taken to indicate consequent on the anxiety. These items were identical the impairment items for depression (as described above) and coded in the same way.

For panic disorder, questioning included: (1) screening questions to identify those who reported experiencing panic-like attacks and the number of such events occurring since the previous assessment (2) a series of dichotomous (Yes/No) items to assess the occurrence of the specific anxiety symptoms (eg pounding of the heart, trembling, shortness of breath, etc) associated with the definition of a panic attack (3) Additional Yes/No items to assess criterion b. (constantly worrying about further attacks, worrying about going crazy, avoiding situations that provoke panic) (4) additional open-ended items asking the participant to describe the situation(s) provoking panic attack(s); the nature, duration and related context of such attacks

For agoraphobia, questioning included: (1) dichotomous (Yes/No) screening items to identify individuals who reported experiencing excessive fear or anxiety in contexts known to be associated with agoraphobia (eg being in crowds, queuing, leaving the home, being in a public place, being on a bridge ,etc); (2) dichotomous (Yes/No) items to assess the occurrence of panic like anxiety symptoms associated with the relevant context (3) additional items assessing whether the participant felt they might be losing control or going mad at the time, whether they avoided situations because of their fears, and the extent to which their fear had impacted on their daily functioning (eg preventing them from traveling, leaving home or going out in public, impacted on their employment or responsibilities, impacted on their social relationships, etc). (4) An additional open-ended question asking the participant to describe the specific situations provoking their fears and their contextual experience.

For specific phobia questioning included: (1) dichotomous (Yes/No) screening items to identify individuals who reported excessive fear or anxiety in the context of specific situations or specific stimuli (e.g. heights, flying, being in a closed space, being in still water, storms, thunder or lightening, being alone, living things, seeing blood or having an injection, going to the dentist or hospital). (2) A series of dichotomous (Yes/No) items to assess the

occurrence of the specific anxiety symptoms (e.g., feeling nervous or panicky, sweating, shortness of breath, etc). (3) Additional items assessing whether the participant avoided situations because of their fears, and the extent to which their fear had impacted on their daily functioning on a three-point scale (1 = *Not at all,* 2 = *Yes Somewhat,* 3 = *Yes A Great Deal)* (e.g. preventing them from taking on new responsibilities; prevented them from going to parties, social events, or meetings; caused problems in your relationship with friends etc.). (4) An open ended question asking the participant to describe the specific situations provoking their fears and their contextual experience.

For social phobia questioning included: (1) dichotomous (Yes/No) screening items to identify individuals who reported excessive fear or anxiety in the context of specific situations or specific stimuli (e.g. speaking in public, writing while some watches, taking part in a meeting etc.). (2) A series of dichotomous (Yes/No) items to assess the occurrence of the specific anxiety symptoms (eg feeling nervous or panicky, sweating, shortness of breath, etc). (3) Additional items assessing whether the participant avoided situations because of their fears, and the extent to which their fear had impacted on their daily functioning on a three-point scale (1 = *Not at all,* 2 = *Yes Somewhat,* 3 = *Yes A Great Deal)* (e.g. kept you from carrying out a task at work or in your education, prevented you from taking on new responsibilities, prevented you from going to parties, social events or meetings, etc.). (4) An open ended question asking the participant to describe the specific situations provoking their fears and their contextual experience.

Based on the above information, participants were classified as to whether they met diagnostic criteria for each disorder in each interview period. For the purposes of the present analysis these data were then combined to produce a single indicator for each interview period, reflecting whether the participant met criteria for any anxiety disorder since the

previous assessment: 16-18 (17.09%), 18-21 (12.86 %), 21-25 (18.15%), 25-30 (18.74%) and 30-35 (18.50%) years.

Alcohol Use Disorder

Alcohol Abuse DSM-III-R

At ages 15 and 16, participants and their parents were questioned in detail about the young person's use of alcohol and problems associated with alcohol use in the previous 12 months. Self-report data on problems associated with alcohol use was assessed using the Rutgers Alcohol Problems Index (RAPI; White & Labouvie, 1989), whereas parental report was based on custom written items assessing the parent's knowledge and perceptions of their child's use of alcohol (see Fergusson et al., 1993). This information was used to classify participants according to DSM-III-R diagnostic criteria for alcohol abuse (American Psychiatric Association, 1987).

The DSM-III-R criteria for alcohol abuse are:

a) A maladaptive pattern of alcohol use indicated by at least one of the following:
    i. Continued use despite knowledge of having a persistent or recurrent social, occupational, psychological, or physical problem that is caused or exacerbated by use of alcohol
    ii. Recurrent use in situations in which it is physically hazardous (e.g. driving while intoxicated)
b) Some symptoms of the disturbance have persisted for at least a month

The ways in which these criteria were operationalised in the CHDS are described below.

The RAPI comprises a total of 30 items describing potential consequences of alcohol misuse. For each item participants were asked whether they had ever drunk so much in the previous 12 months that the event had occurred, and if so, to report the number of times this

had occurred in the previous 12 months. For the purposes of the CHDS a subset of items from the RAPI were selected to define the criteria for alcohol abuse. These items included: being unable to do homework or study or a test; going to school drunk; neglecting their responsibilities; missing a day off school or work; had an accident or hurt yourself; being arrested or brought home by a policeman for drunkenness; having a fight or argument with friends/relatives; having relatives avoid you (because of your drinking); causing shame or embarrassment to someone (because of your drinking). Participants who reported any of these events more than once were classified as meeting DSM-III-R criteria for alcohol abuse.

Parental reports of alcohol related problems comprised a series of custom written items asking the number of occasions the following things had happened in the previous 12 months as a result of the child's drinking: child was clearly tipsy or drunk; child became ill/vomited; child became sleepy or drowsy; child had a hangover; child behaved in an anti-social or embarrassing way; child became physically violent or verbally abusive; and any other significant problem. Parents were also asked the extent to which they were concerned that their child may have an alcohol problem at present. For the purposes of the CHDS the participant was classified as meeting criteria for alcohol abuse on the basis of parental report if they were reported to have exhibited any of the above behaviours more than once in the past year or the parent reported significant concern that their child may have an alcohol problem. For the purposes of the present analysis the parental and self-report diagnostic classifications were combined across source and across the two interview periods to derive a single measure reflecting whether the young person met criteria for alcohol abuse on the basis of either self or parent report at any time in the two year interval from age 14-16 years. Based on this definition, 10.58% of the sample were classified as meeting criteria for alcohol abuse over this period.

Alcohol Use Disorder DSM-IV

At ages 18, 21, 25, 30 and 35 years, participants were questioned about problems related to alcohol use since the previous assessment using the relevant CIDI items (World Health Organization, 1993) to assess DSM-IV symptom criteria for both alcohol abuse and alcohol dependence. The DSM-IV (American Psychiatric Association, 2000) criteria for these disorders are as follows:

Alcohol Abuse

The DSM-IV criteria for alcohol abuse include:

i. Recurrent alcohol use resulting in a failure to fulfil major role obligations at work, school, or home (e.g., repeated absences from work or school)
ii. Recurrent alcohol use in situations in which it is physically hazardous (e.g. driving while intoxicated)
iii. Recurrent alcohol-related legal problems (e.g., arrests for alcohol related disorderly conduct)
iv. Continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance (e.g., arguments with family about consequences of intoxication)

To meet DSM-IV criteria for alcohol abuse, an individual must have experienced one or more of the above criteria.

Alcohol Dependence

The DSM-IV criteria for alcohol dependence include:

i. Increased tolerance for alcohol, demonstrated by either a need for markedly increased amounts of alcohol in order to achieve intoxication, or markedly diminished effect with continued use of the same amount

ii. Withdrawal, as manifested by either symptoms characteristic of alcohol withdrawal, or that alcohol is taken to relieve or avoid withdrawal symptoms
iii. The substance is often taken in larger amounts or over a longer period than intended
iv. There is a persistent desire or unsuccessful efforts to cut down or control alcohol use
v. A great deal of time is spent in activities necessary to obtain alcohol, use the substance, or recover from its effects
vi. Important social, occupational, or recreational activities are given up or reduced because of substance use
vii. The substance is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to be exacerbated by the substance

To meet DSM-IV criteria for alcohol dependence an individual must meet three or more of the above criteria at the same time in a 12-month period. Where an individual meets criteria for both abuse and dependence, the alcohol dependence diagnosis takes precedence.

The CIDI (World Health Organization, 1993) based questioning assessed these criteria in the following ways: (1) participants were asked a series of 13 items that addressed the abuse criteria in one or more ways. Specifically participants were asked whether a series of events (eg objections about their drinking from family, friends or partner; getting into fights; being unable to go to work or study as a result of drinking; having an accident, etc) had occurred as a result of their drinking, and the number of times this had occurred since the previous assessment. Questioning was conducted separately for each 12-month period since the previous assessment. (2) A further nine items that directly assessed the frequency of

specific alcohol dependence criteria in one or more ways for each 12 month period since the previous assessment (eg having difficulty stopping drinking before you were drunk; spending large amounts of time drinking or getting over the effects of alcohol; needing to drink more and more to get the same effect, etc). (3) further items were used to assess whether the individual had continued to use alcohol despite reporting problems associated with alcohol use in any given 12 month period; whether the individual had attempted to quit or cut down on their drinking in the interview period but couldn't; whether they had experienced (Yes/No) any of a series of nine withdrawal symptoms (eg shakes/trembling, unable to sleep, headaches, nausea, sweating, fits or seizures, etc) as a result of attempts to cut down or quit; or had to take a drink to keep from having withdrawal symptoms or to make them go away.

Based on the above, participants were classified as to whether they met diagnostic criteria for either alcohol abuse or alcohol dependence for each interview period. For the purposes of the present analyses the two diagnoses were combined into a single measure reflecting whether the individual met criteria for any alcohol use disorder (abuse or dependence) in the period since the previous assessment: Based on this, the following percentages of the sample were defined as having an alcohol use disorder during each interview period: 16-18 (19.43%), 18-21 (29.18%), 21-25 (23.23%), 25-30 (13.88%) and 30-35 (14.76%) years.

Illicit Substance Use Abuse / Disorder

Illicit Substance Use / Abuse DSM-III-R

Illicit Substance Use / Abuse. At ages 15 and 16 years, participants and their parents were questioned about the young person's use of illicit drugs since the previous assessment including cannabis, solvents, uppers, downers, and other prescription medicines, heroin, opiates, cocaine and other substances. Participants were questioned using custom written items to assess quantity/frequency of use and problems associated with drug use. Parents

were asked to report their impressions of their child's engagement in illicit drug use. (See Fergusson et al., 1993). This information was used to classify participants according to DSM-III-R diagnostic criteria for illicit substance abuse. The DSM-III-R criteria are essentially the same as those for alcohol abuse above, but re-specified in relation to illicit substance use.

The ways in which these criteria were operationalised in the CHDS were as follows. Participants were questioned as to whether (Yes/No) they had experienced a series of problems resulting from their use of cannabis or other illicit drug in the previous 12 months. These problems included: missing school; getting into trouble with parents; falling out with friends; getting poorer marks/grades at school; getting into trouble at school (for drug use); getting into trouble with the Police; and getting into fights. Participants who reported any of the above in a given interview period were classified as meeting criteria for illicit substance abuse in that period. Parents were questioned using a custom written item as to their impressions of their child's engagement in illicit drug use. Responses were coded on a five-point scale: 1 = *Child is just experimenting out of curiosity*, 2 = *Child is beginning to become a drug user*, 3 = *Child is on way to using drugs regularly*, 4 = *Child is a regular drug user*, or 5 = *Child does not use illicit drugs.* For the purposes of the CHDS a participant was classified as meeting criteria for illicit substance abuse if their parent reported that their child was a regular drug user. For the purposes of the present analysis the substance abuse classifications were combined across sources and over time to create a composite measure reflecting whether the participant was classified as meeting criteria for illicit substance abuse on the basis of either self or parent report over the interval from age 14-16 years. Using this definition 4.05% of the sample met criteria for illicit substance use disorder over this interval.

Illicit Substance Use Disorder DSM-IV

At ages 18, 21, 25, 30 and 35 years, participants were questioned about their use of cannabis, and other illicit drugs since the previous assessment including: solvents, sedatives,

methamphetamine, heroin, morphine and other opiates, cocaine, ecstasy, BZP or other party pills, LSD and other hallucinogens, other prescription medicines and any other substances used to create a high. Participants who reported use of illicit drugs were further questioned on a series of Yes/No items concerning any problems they had experienced consequent on their substance use since the previous assessment. The assessment of problems comprised a series of 15 items derived from the CIDI (World Health Organization, 1993) that targeted specific diagnostic criteria for either DSM-IV (American Psychiatric Association, 2000) substance abuse or substance dependence in one or more ways. Separate questioning was conducted for problems related to cannabis use and problems related to the use of other illicit drugs. The phrasing of these items was similar to the sample items described for assessing DSM-IV alcohol use disorders above. Using these data participants were classified as to whether they met DSM-IV diagnostic criteria for the following substance use disorders in each interview period: cannabis abuse, cannabis dependence, other illicit substance abuse, other illicit substance dependence. The DSM-IV criteria for substance abuse and substance dependence essentially mirror those described for alcohol abuse/dependence, but rephrased to reflect illicit substance use. For the purposes of the present study the diagnostic classifications were combined into a single measure for each interview period reflecting whether the participant met criteria for any illicit substance use disorder in that interval. Based on this classification the rates of illicit substance use disorder in each interview period were: 16-18 (12.21%); 18-21 (15.33%); 21-25 (14.96%); 25-30 (8.71%) and 30-35 years (8.32%).

Appendix C: Non-Epoch Cox Regression Model of Parenthood

Table C1:
Non-Epoch fitted Cox regression model

	B(SE)	*P*	Hazard Ratio (95% Confidence Interval)
Female	0.20 (0.07)	<.05	1.22 (1.06 – 1.41)
Māori	0.31 (0.10)	<.05	1.37 (1.13 – 1.65)
Loglikelihood ratio	$\chi^2(2) = 17.69$, p <.001		

Note: N = 1050

Appendix D: Family of Origin and Individual predictors of Parenthood

Table D1:
Non-Epoch Cumulative rates (%) of parenthood by measures of childhood and adolescent covariates.

Measure	N (%)
Demographic	
Sex at Birth	
Female	534 (79.1)
Male	521 (75.1)
	$\chi^2(1) = 8.50$, $p < .01$
Ethnic	
Māori	172 (80.3)
Non-Māori	878 (76.6)
	$\chi^2(1) = 11.87$, $p < .005$
Sociodemographic Background	
Family Socio-economic Status (birth)	
Professional, managerial	217 (80.8)
Clerical, technical, skilled	574 (75.7)
Semiskilled, unskilled, unemployed	264 (76.7)
	$\chi^2(2) = 23.60$, $p < .0001$
Maternal Education (birth)	
Tertiary qualifications	211 (71.9)
High school qualifications	319 (79.9)
No qualification	525 (77.9)
	$\chi^2(2) = 19.40$, $p < .0001$
Paternal Education (birth)	
Tertiary qualifications	195 (77.7)
High school qualifications	337 (73.1)
No qualification	490 (79.7)
	$\chi^2(2) = 16.54$, $p < .005$
Average family living standards (0 – 10 years)	
Highest 51-100%	545 (77.7)
Middle 26-50%	257 (74.9)
Lowest 25%	244 (78.8)
	$\chi^2(2) = 16.53$, $p < .005$
Family Structure	
Maternal age at first childbirth	
25+	639 (74.7)
20-24	323 (81.0)
<20	93 (82.1)
	$\chi^2(2) = 28.21$, $p < .0001$

Measure	N (%)
Born into two-parent family	
Yes	988 (76.7)
No	67 (85.2)
	$\chi^2(1) = 21.75$, $p < .0001$
Childhood parental changes (0-16years)	
None	661 (77.0)
1-2	200 (74.5)
3+	194 (80.3)
	$\chi^2(2) = 25.79$, $p < .0001$
Family Functioning	
Parental IPV	
Lowest 50%	570 (77.5)
Middle 51-75%	227 (76.6)
Highest 25%	227 (77.5)
	$\chi^2(2) = 4.77$, $p = .09$
Parental history of offending	
No	844 (76.1)
Yes	129 (82.3)
	$\chi^2(1) = 14.21$, $p < .001$
Parental history of substance use	
No	692 (76.2)
Yes	313 (78.7)
	$\chi^2(1) = 6.38$, $p < .05$
Parental Attachment	
Lowest 25%	237 (80.1)
Middle 50%	477 (75.0)
Highest 25%	241 (80.7)
	$\chi^2(2) = 2.66$, $p = .26$
Childhood Abuse Exposure	
Parental use of physical punishment	
Never/seldom	867 (77.1)
Regular	118 (73.3)
Severe	67 (83.0)
	$\chi^2(2) = 29.44$, $p < .0001$
Childhood sexual abuse	
None/noncontact	904 (77.2)
Contact no intercourse	82 (79.4)
Intercourse	66 (74.0)
	$\chi^2(2) = 5.85$, $p = .05$

Measure	N (%)
Child Behaviour	
Conduct problems	
Lowest 50%	523 (77.0)
Middle 51-75%	263 (79.3)
Middle 76-90%	145 (73.6)
Highest 10%	99 (76.3)
	$\chi^2(3) = 7.35$, $p = .06$
Attentional problems	
Lowest 50%	534 (78.1)
Middle 51-75%	245 (76.2)
Middle 76-90%	170 (79.2)
Highest 10%	81 (68.6)
	$\chi^2(3) = 4.71$, $p = .19$
School achievement	
Scholastic ability (7-13 years)	
Highest 25%	210 (72.1)
Middle 50%	364 (80.5)
Lowest 25%	193 (75.5)
	$\chi^2(2) = 10.66$, $p < .05$
Scholastic performance (11-13 years)	
Highest 25%	248 (71.9)
Middle 50%	499 (78.9)
Lowest 25%	245 (78.6)
	$\chi^2(2) = 10.25$, $p < .05$
Adolescent Factors	
Neuroticism (14 years)	
Lowest 50%	504 (74.5)
Middle 51-75%	232 (79.7)
Highest 25%	225 (81.9)
	$\chi^2(2) = 10.34$, $p < .05$
Early regular substance use (<15 years)	
No	632 (76.4)
Yes	323 (80.4)
	$\chi^2(1) = 7.50$, $p < .05$
Deviant Peer affiliation (15 years)	
Lowest 50%	442 (74.7)
Middle 51-75%	242 (78.0)
Highest 25%	271 (82.5)
	$\chi^2(2) = 24.89$, $p < .0001$

Measure	N (%)
Early history of depression	
No	892 (77.0)
Yes	59 (87.6)
	$\chi^2(1) = 14.48$, $p < .001$
Early sexual intercourse	
No	766 (75.7)
Yes	258 (82.2)
	$\chi^2(1) = 33.78$, $p < .0001$
Novelty seeking (16 years)	
Lowest 25%	217 (74.9)
Middle 50%	474 (77.6)
Highest 25%	253 (80.4)
	$\chi^2(2) = 7.90$, $p < .05$

Appendix E: Family of Origin and Individual Predictors of Parenthood by Sex at Birth

Table E1:
Non-Epoch cumulative rates (%) of parenthood for males and females based on sex at birth by measures of childhood and adolescent covariates.

	Female	Male
Measure	N (%)	N (%)
Demographic		
Ethnicity		
Māori	88 (77.8)	84 (84.4)
Non-Māori	443 (79.4)	435 (73.8)
	$\chi^2(1)=3.4$, $p = .06$	$\chi^2(1)=9.7$, $p <.01$
Interaction	$p = .42$	
Socio-demographic Background		
Family Socio-economic Status (birth)		
Professional, managerial	119 (79.1)	98 (73.6)
Clerical, technical, skilled	291 (76.8)	283 (74.5)
Semiskilled, unskilled, unemployed	124 (84.2)	140 (77.9)
	$\chi^2(2)=19.7$, $p <.0001$	$\chi^2(2)=8.7$, $p=.01$
Interaction	$p = .56$	
Maternal Education (birth)		
Tertiary qualification	115 (79.7)	96 (61.8)
High School qualification	150 (80.6)	169 (79.3)
No qualification	269 (78.2)	256 (78.0)
	$\chi^2(2)=7.4$, $p =.02$	$\chi^2(2)=14.7$, $p <.01$
Interaction	$p = .35$	
Paternal Education (birth)		
Tertiary qualification	103 (79.7)	92 (75.7)
High School qualification	159 (73.6)	178 (72.6)
No qualification	256 (81.9)	234 (77.4)
	$\chi^2(2)=9.4$, $p =.01$	$\chi^2(2)=6.7$, $p =.03$
Interaction	$p = .82$	
Average family living standards (0-10years)		
Highest 51-100%	283 (78.7)	262 (76.5)
Middle 26-50%	131 (77.3)	126 (72.3)
Lowest 25%%	118 (81.5)	126 (76.7)
	$\chi^2(2)=19.7$, $p <.0001$	$\chi^2(2)=2.85$, $p =.24$
Interaction	$p = .11$	

Measure	Female N (%)	Male N (%)
Family Structure		
Maternal age at first childbirth		
25+	333 (77.9)	306 (71.1)
20-24	151 (79.4)	172 (83.3)
<20	50 (86.6)	43 (76.7)
	$\chi^2(2)=23.9, p<.0001$	$\chi^2(2)=12.3, p<.01$
Interaction	$p = .32$	
Born into two-parent family		
Yes	500 (78.5)	488 (75.0)
No	34 (88.2)	33 (82.5)
	$\chi^2(1)=22.7, p<.0001$	$\chi^2(1)=4.6, p = .03$
Interaction	$p = .10$	
Childhood parental changes (0- 16 years)		
None	328 (77.4)	333 (76.6)
1-2	99 (78.5)	101 (70.5)
3+	107 (84.5)	87 (75.3)
	$\chi^2(2)=30.1, p<.0001$	$\chi^2(2)=2.6, p=.28$
Interaction	$p = .003$	
Family Functioning		
Parental IPV		
Lowest 50%	281 (78.5)	289 (76.5)
Middle 51 – 75%	115 (77.0)	112 (76.2)
Highest 25%	124 (80.6)	103 (74.5)
	$\chi^2(2)=8.25, p<.05$	$\chi^2(2)=.05, p=.98$
Interaction	$p = .17$	
Parental history of offending		
No	432 (78.2)	412 (73.8)
Yes	63 (82.2)	66 (83.0)
	$\chi^2(1)=12.1, p<.005$	$\chi^2(1)=4.5, p=.03$
Interaction	$p = .33$	
Parental history of substance use / abuse		
No	338 (77.4)	354 (75.0)
Yes	172 (81.8)	141 (74.8)
	$\chi^2(1)=7.1, p<.05$	$\chi^2(1)=0.50, p=.48$
Interaction	$p = .20$	
Parental attachment		
Lowest 25%	124 (84.7)	113 (75.0)
Middle 50%	230 (77.1)	247 (73.1)
Highest 25%	131 (80.1)	110 (81.6)
	$\chi^2(2)=4.1, p=.13$	$\chi^2(2)=0.60, p=.74$
Interaction	$p = .17$	

Measure	Female N (%)	Male N (%)
Childhood Abuse Exposure		
Parental use of physical punishment		
Never/seldom	447 (78.8)	420 (75.4)
Regular	43 (74.4)	75 (72. 5)
Severe	42 (85.7)	25 (79.7)
	$\chi^2(2)=27.7$, $p<.0001$	$\chi^2(2)=5.1$, $p=.07$
Interaction	$p = .20$	
Childhood sexual abuse		
None / no contact	412 (79.6)	492 (75.2)
Contact no intercourse	67(78.1)	15 (88.9)
Intercourse	53 (76.3)	13 (61.5)
	$\chi^2(2)=2.1$, $p=.36$	$\chi^2(2)=1.5$, $p=.47$
Interaction	$p = .74$	
Child behaviour		
Conduct problems		
Lowest 50%	308 (79.5)	215 (73.3)
Middle 51-75%	130 (76.6)	133 (82.8)
Middle 76-90%	58 (80.7)	87 (68.7)
Highest 10%	26 (87.7)	73 (71.8)
	$\chi^2(3)=13.2$, $p<.01$	$\chi^2(3)=5.33$, $p=.15$
Interaction	$p = .02$	
Attentional problems		
Lowest 50%	343 (79.3)	191 (76.1)
Middle 51-75%	110 (79.7)	135 (73.3)
Middle 76-90%	41 (83.8)	110 (75.6)
Highest 10%	28 (70.5)	72 (73.6)
	$\chi^2(3)=7.02$, $p=.07$	$\chi^2(3)=7.33$, $p=.06$
Interaction	$p = .88$	
School achievement		
Scholastic ability (7-13 years)		
Highest 25%	115 (78.1)	95 (64.6)
Middle 50%	196 (81.4)	168 (79.4)
Lowest 25%	81 (77.5)	112 (74.4)
	$\chi^2(2)=3.63$, $p=.16$	$\chi^2(2)=9.81$, $p<.05$
Interaction	$p = .37$	
Scholastic performance (11-13 years)		
Highest 25%	166 (74.2)	82 (67.1)
Middle 50%	256 (83.3)	243 (74.1)
Lowest 25%	82(75.4)	163 (80.5)
	$\chi^2(2)=8.88$, $p<.05$	$\chi^2(2)=10.97$, $p<.01$
Interaction	$p = .28$	

Measure	Female N (%)	Male N (%)
Adolescent Factors		
Neuroticism (14 years)		
Low 50%	214 (77.4)	290 (72.3)
Mid 51-75%	119 (77.6)	113 (81.8)
High 25%	156 (84.5)	69 (75.7)
	$\chi^2(2)=6.78$, $p<.05$	$\chi^2(2)=2.60$, $p=.27$
Interaction	$p=.57$	
Early regular substance use (<15 years)		
No	328 (76.0)	304 (77.0)
Yes	157 (87.6)	166 (72.6)
	$\chi^2(1)=17.1$, $p<.0001$	$\chi^2(1)=.003$, $p=.96$
Interaction	$p=.005$	
Deviant peer affiliation (15 years)		
Lowest 50%	208 (75.7)	234 (73.8)
Middle 51-75%	128 (81.4)	114 (74.3)
Highest 25%	149 (84.6)	122 (79.7)
	$\chi^2(2)=14.53$, $p<.005$	$\chi^2(2)=10.05$, $p<.05$
Interaction	$p=.28$	
Early history of depression		
No	439 (78.6)	453 (75.6)
Yes	44 (92.3)	15 (75.0)
	$\chi^2(1)=13.8$, $p<.001$	$\chi^2(1)=.35$, $p=.56$
Interaction	$p=.18$	
Early sexual intercourse		
No	385 (75.7)	381 (75.7)
Yes	135 (87.1)	123 (76.4)
	$\chi^2(1)=37.7$, $p<.0001$	$\chi^2(1)=4.5$, $p=.03$
Interaction	$p=.02$	
Novelty seeking (16 years)		
Lowest 25%	114 (76.6)	103 (72.9)
Middle 50%	238 (78.9)	236 (76.3)
Highest 25%	126 (83.7)	127 (76.9)
	$\chi^2(2)=5.30$, $p=.07$	$\chi^2(2)=3.38$, $p=.18$
Interaction	$p=.41$	

Appendix F: Family of Origin and Individual predictors of Parenthood by Māori and non-Māori

Table F1:
Non-Epoch cumulative rates (%) of parenthood for Māori and non-Māori by measures of childhood and adolescent covariates.

	Māori	Non-Māori
Measure	N (%)	N (%)
Demographic		
Sex at Birth		
Female	88 (77.8)	443 (79.4)
Male	84 (84.4)	435 (73.8)
	$\chi^2(1)=.31$, $p=.58$	$\chi^2(1)=8.9$, $p<.01$
Interaction	$p = .42$	
Socio-demographic Background		
Family Socio-economic Status (birth)		
Professional, managerial	17 (54.3)	200 (78.7)
Clerical, technical, skilled	91 (86.2)	481 (73.8)
Semiskilled, unskilled, unemployed	64 (80.4)	197 (81.1)
	$\chi^2(2)=9.5$, $p<.05$	$\chi^2(2)=16.0$, $p<.01$
Interaction	$p = .052$	
Maternal Education (birth)		
Tertiary qualification	10 (60.0)	199 (72.2)
High School qualification	49 (81.9)	270 (79.5)
No qualification	113 (81.0)	409 (77.0)
	$\chi^2(2)=2.2$, $p=.33$	$\chi^2(2)=14.3$, $p<.005$
Interaction	$p = .80$	
Paternal Education (birth)		
Tertiary qualification	8 (50.0)	186 (79.1)
High School qualification	53 (85.3)	283 (70.9)
No qualification	98 (78.3)	389 (80.1)
	$\chi^2(2)=4.2$, $p=.12$	$\chi^2(2)=15.7$, $p<.001$
Interaction	$p = .67$	

Measure	Māori N (%)	Non-Māori N (%)
Average family living standards (0-10years)		
Highest 51-100%	48 (78.2)	495 (77.6)
Middle 26-50%	49 (82.0)	206 (73.2)
Lowest 25%%	74 (81.9)	169 (77.1)
	χ^2 (2)=1.62, p =.45	χ^2 (2)=10.87, p <.05
Interaction	p = .005	
Family Structure		
Maternal age at first childbirth		
25+	69 (71.5)	567 (75.2)
20-24	73 (90.2)	249 (78.4)
<20	30 (79.0)	62 (83.6)
	χ^2 (2)=6.5, p =.04	χ^2 (2)=18.4, p <.001
Interaction	p =.77	
Born into two-parent family		
Yes	148 (78.9)	835 (76.4)
No	24 (89.5)	43 (83.0)
	χ^2(1)=7.7, p =.005	χ^2(1)=9.0, p <.01
Interaction	p =.30	
Childhood parental changes (0- 16 years)		
None	72 (76.0)	585 (77.1)
1-2	35 (79.0)	164 (73.7)
3+	65 (86.4)	129 (77.2)
	χ2(2)=9.3, p =.009	χ^2 (2)=10.6, p =.005
Interaction	p = .77	
Family Functioning		
Parental IPV		
Lowest 50%	78 (78.6)	491 (77.4)
Middle 51 – 75%	31 (77.4)	193 (76.4)
Highest 25%	56 (84.4)	171 (75.4)
	χ^2(2)=2.19, p =.34	χ^2(2)=1.55, p =.46
Interaction	p =.54	

Measure	Māori N (%)	Non-Māori N (%)
Parental history of offending		
No	119 (79.4)	725 (75.5)
Yes	40 (79.1)	89 (83.3)
	χ2(1)=.22, p =.64	χ^2(1)=14.2, p <.001
Interaction	p =.17	
Parental history of substance use / abuse		
No	92 (82.2)	599 (75.3)
Yes	73 (77.7)	240 (79.1)
	χ^2(1)=.53, p =.47	χ^2(1)=4.3, p =.04
Interaction	p = .90	
Parental attachment		
Lowest 25%	53 (77.1)	183 (81.1)
Middle 50%	73 (83.4)	404 (73.6)
Highest 25%	27 (88.4)	213 (79.8)
	χ^2(2)=.30, p =.86	χ^2(2)=1.87, p =.39
Interaction	p = .90	
Childhood Abuse Exposure		
Parental use of physical punishment		
Never/seldom	125 (79.3)	738 (76.8)
Regular	26 (75.7)	92 (72.8)
Severe	19 (89.5)	48 (80.2)
	χ^2(2)=16.2, p <.001	χ^2(2)=12.9, p <.01
Interaction	p = .04	
Childhood sexual abuse		
None / no contact	141 (78.8)	759 (77.0)
Contact no intercourse	17 (91.2)	65 (76.5)
Intercourse	12 (75.0)	54 (73.3)
	χ^2(2)=4.6, p =.10	χ^2(2)=2.6, p =.28
Interaction	p = .17	

Measure	Māori N (%)	Non-Māori N (%)
Child behaviour		
Conduct problems		
Lowest 50%	61 (77.8)	458 (76.8)
Middle 51-75%	49 (80.1)	214 (79.2)
Middle 76-90%	30 (77.8)	114 (72.5)
Highest 10%	28 (90.4)	71 (70.5)
	$\chi^2(3)=6.34$, $p=.10$	$\chi^2(3)=2.11$, $p=.55$
Interaction	$p = .006$	
Attentional problems		
Lowest 50%	73 (80.6)	458 (77.7)
Middle 51-75%	46 (80.1)	197 (75.2)
Middle 76-90%	27 (73.8)	124 (78.5)
Highest 10%	22 (86.4)	78 (68.4)
	$\chi^2(3)=5.16$, $p=.16$	$\chi^2(3)=3.47$, $p=.32$
Interaction	$p = .25$	
School achievement		
Scholastic ability (7-13 years)		
Highest 25%	16 (75.0)	194 (71.7)
Middle 50%	61 (79.3)	302 (80.8)
Lowest 25%	34 (84.0)	159 (73.7)
	$\chi^2(2)=6.87$, $p<.05$	$\chi^2(2)=6.59$, $p<.05$
Interaction	$p = .50$	
Scholastic performance (11-13 years)		
Highest 25%	32 (76.2)	216 (71.2)
Middle 50%	87 (78.1)	411 (79.1)
Lowest 25%	44 (89.5)	201 (76.3)
	$\chi^2(2)=7.05$, $p<.05$	$\chi^2(2)=6.35$, $p<.05$
Interaction	$p = .34$	

Measure	Māori N (%)	Non-Māori N (%)
Adolescent Factors		
Neuroticism (14 years)		
Lowest 50%	79 (81.2)	424 (73.3)
Middle 51-75%	40 (76.5)	192 (80.3)
Highest 25%	39 (88.2)	186 (80.6)
	$\chi^2(2)=5.59$, $p=.06$	$\chi^2(2)=7.34$, $p<.05$
Interaction	$p = .52$	
Early regular substance use (<15 years)		
No	89 (81.8)	542 (75.5)
Yes	64 (82.0)	258 (79.9)
	$\chi^2(1)=3.0$, $p=.08$	$\chi^2(1)=4.06$, $p=.04$
Interaction	$p = .36$	
Deviant peer affiliation (15 years)		
Lowest 50%	53 (77.5)	388 (74.3)
Middle 51-75%	36 (91.9)	205 (76.0)
Highest 25%	64 (81.0)	207 (83.0)
	$\chi^2(2)=2.67$, $p=.26$	$\chi^2(2)=20.71$, $p<.0001$
Interaction	$p = .39$	
Early history of depression		
No	140 (82.8)	752 (76.2)
Yes	12 (83.3)	47 (89.6)
	$\chi^2(1)=.39$, $p=.53$	$\chi^2(1)=15.3$, $p<.0001$
Interaction	$p = .30$	
Early sexual intercourse		
No	100 (77.2)	663 (75.5)
Yes	65 (85.4)	192 (81.1)
	$\chi^2(1)=1.78$, $p=.18$	$\chi^2(1)=30.1$, $p<.0001$
Interaction	$p = .20$	

Measure	Māori N (%)	Non-Māori N (%)
Novelty seeking (16 years)		
Lowest 25%	32 (87.5)	184 (72.7)
Middle 50%	75 (79.7)	399 (77.2)
Highest 25%	46 (81.8)	206 (80.1)
	$\chi^2(2)=.39$, $p=.82$	$\chi^2(2)=10.11$, $p<.05$
Interaction	$p = .19$	

APPENDIX G: Main Models Re-run with Alternative Māori cohort (no descent)

Additional sensitivity analyses were conducted to rerun main models from both study 1 and 2 using the new Māori classification that excluded Māori that were only of Māori descent. Therefore, the Māori cohort, were limited to those who identified their ethnicity as Māori.

Table G1 to G6 are comparable to Study 1 examining the factors associated with the onset of parenthood. Each table directly corresponds with a table in Study 1. Likewise, tables G7 to G10 are comparable to Study 2, examining the onset of parenthood and outcomes at age 40. Again, each table directly corresponds with a table in Study 2.

Table G1
Fitted Cox regression model of Epoch 1 and Epoch 2 for new classification of Māori to exclude only descent

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
	B (SE)	P	Hazard Ratio (95% CI)	B (SE)	P	Hazard Ratio (95% CI)
Female	0.54 (0.13)	<.0001	1.73 (1.34–2.2)	0.02 (0.09)	0.79	1.02 (0.86–1.22)
Māori	1.05 (0.14)	<.0001	2.85 (2.16–3.75)	-0.32 (0.17)	0.06	0.73 (0.53–1.01)

Note: N = 1055, $\chi^2(4) = 71.61$, $p < .0001$

Table G2

Cox regression model with fixed factors simplified for new classification of Māori to exclude only descent

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
Fixed Factors	B(SE)	*P*	HR (95% CI)	B(SE)	*P*	HR (95% CI)
Female	0.84 (0.13)	**<.0001**	2.32 (1.78–3.03)	0.02 (0.09)	0.79	1.02 (0.86–1.22)
Māori **no descent**	0.52 (0.15)	**.001**	1.69 (1.26–2.27)	−0.32 (0.17)	0.06	0.73 (0.53–1.01)
Family socio-economic status	−0.24 (0.11)	**0.03**	0.79 (0.63–0.98)			
Average family living standards 0–10 years	−0.80 (0.18)	**<.0001**	0.45 (0.32–0.64)			
Born into two-parent family	−0.45 (0.19)	**0.02**	0.64 (0.44–0.93)			
Parental use of physical punishment	0.22 (0.09)	**0.01**	1.25 (1.05–1.49)			
Scholastic performance	−0.25 (0.08)	**0.001**	0.78 (0.67–0.91)			
Deviant peer affiliation*	0.07 (0.03)	**0.01**	1.07 (1.02–1.13)			
Early sexual intercourse	0.61 (0.15)	**<.001**	1.84 (1.38–2.45)			
Novelty seeking *	0.03 (0.01)	**0.03**	1.03 (1.00–1.06)			

Note: N = 1055, Likelihood ratio χ^2 (12) = 246.12, p < .0001

* HR (95% CI) are all calculated to reflect one standard deviation change in the predictor

Table G3

Cox regression model, time-dynamic factors (main effects) for new classification of Māori to exclude only descent

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
Time-dynamic measures	B(SE)	*P*	HR (95% CI)	B(SE)	*P*	HR (95% CI)
Female	0.70 (0.15)	**<.0001**	2.02 (1.52–2.69)	−0.04 (0.09)	0.64	0.96 (0.80–1.14)
Māori no descent	0.82 (0.16)	**<.0001**	2.27 (1.67–3.08)	−0.28 (0.17)	0.10	0.76 (0.54–1.06)
Duration of relationship	0.16 (0.04)	**.0003**	1.17 (1.07–1.27)	0.14 (0.01)	**<.0001**	1.15 (1.12–1.18)
Full-time employment	0.41 (0.10)	**<.0001**	1.51 (1.24–1.83)	0.11 (0.04)	**.01**	1.12 (1.02–1.22)
Benefit	0.36 (0.12)	**.005**	1.42 (1.11–1.81)	−0.21 (0.09)	**.02**	0.81 (0.68–0.97)
Depression	0.36 (0.15)	**.02**	1.42 (1.06–1.92)			
Alcohol problems	0.50 (0.15)	**.002**	1.65 (1.21–2.25)			
Other substance use problems	0.44 (0.18)	**.01**	1.56 (1.09–2.22)			
Highest qualification	−0.49 (0.15)	**.001**	0.61 (0.46–0.82)			
Enrolled Full-time	−0.77 (0.23)	**.001**	0.46 (0.30–0.72)			

Note N = 1055, $\chi^2(15) = 330.06$, $p < .0001$

Table G4

Final Cox regression model of fixed factors and time-dynamic factors predicting the onset of parenthood for new classification of Māori to exclude only descent

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
	B(SE)	*p*	HR (95% CI)	B(SE)	*p*	HR (95% CI)
Female	0.86 (0.15)	**<.0001**	2.35 (1.76–3.15)	−0.04 (0.09)	0.64	0.96 (0.80–1.14)
Māori no descent	0.55 (0.16)	**0.001**	1.74 (1.26–2.40)	−0.28 (0.17)	0.10	0.76 (0.54–1.06)
Fixed Factors Model						
Family Socioeconomic Status	−0.27 (0.12)	**0.02**	0.76 (0.61–0.95)			
Born into two-parent family	−0.51 (0.20)	**0.01**	0.60 (0.40–0.90)			
Parental use of physical punishment	0.35 (0.09)	**0.001**	1.42 (1.18–1.70)			
Scholastic performance	−0.35 (0.08)	**<.0001**	0.70 (0.60–0.83)			
Deviant peer affiliation*	0.08 (0.03)	**0.007**	1.08 (1.02–1.14)			
Early sexual intercourse	0.47 (0.16)	**0.003**	1.60 (1.18–2.17)			
Time-Dynamic Model						
Duration of relationship	0.14 (0.04)	**0.002**	1.15 (1.05–1.25)	0.14 (0.01)	**<.0001**	1.15 (1.12–1.18)
Full-time employment	0.26 (0.09)	**0.003**	1.30 (1.09–1.53)	0.11 (0.04)	**.01**	1.12 (1.02–1.22)
Benefit				−0.21 (0.09)	**.02**	0.81 (0.68–0.97)
Alcohol problems	0.57 (0.15)	**.0001**	1.76 (1.32–2.36)			
Enrolled in full-time study	−0.60 (0.23)	**0.01**	0.55 (0.36–0.86)			

Note N = 1055 $\chi^2(17) = 380.97$, $p<.0001$* HR(95% CI) are all calculated to reflect one standard deviation change in the predictor

Table G5

Final Cox regression model of fixed factors, time-dynamic factors and Māori cultural variables for the Māori cohort for new classification of Māori to exclude only descent

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
	B(SE)	*p*	HR (95% CI)	B(SE)	*p*	HR (95% CI)
Female	0.40 (0.36)	0.27	1.49 (0.73–3.04)	−0.58 (0.35)	**0.09**	0.56 (0.28–1.10)
Fixed Factors Model						
Family Socioeconomic Status	−0.12 (0.31)	0.69	0.88 (0.48–1.63)			
Born into two-parent family	0.27 (0.43)	0.53	1.31(0.57–3.05)			
Parental use of physical punishment	0.39 (0.17)	**0.03**	1.47 (1.05–2.07)			
Scholastic performance	0.28 (0.22)	0.20	1.33 (0.86–2.05)			
Deviant peer affiliation*	0.00 (0.07)	0.99	1.00 (0.87–1.15)			
Early sexual intercourse	0.00 (0.33)	1.00	1.00 (0.52–1.92)			
Time-Dynamic Model						
Duration of relationship	−0.01 (0.12)	0.91	0.99 (0.78–1.25)	0.02 (0.05)	0.61	1.02 (0.94–1.12)
Full-time employment	−0.78 (0.17)	**<.0001**	0.46 (0.33–0.64)	−0.39 (0.13)	**.002**	0.68 (0.53–0.87)
Benefit				−0.83 (0.36)	**.02**	0.43 (0.21–0.89)
Alcohol problems	−0.16 (0.35)	0.64	0.85 (0.43–1.69)			
Enrolled in full-time study	−0.69 (0.60)	0.25	0.50 (0.15–1.63)			

Māori Culture						
Total Māori cultural score	0.06 (0.03)	**0.02**	1.06 (1.01–1.12)	−0.02 (0.02)	**0.22**	0.98 (0.94–1.01)

Note N = 122, $\chi^2(17) = 177.30$, $p < .0001$ * HR(95% CI) are all calculated to reflect one standard deviation change in the predictor.

Table G6

Combined Cox regression model of fixed factors, Time-dynamic factors and Māori cultural variables for new classification of Māori to exclude only descent

	Epoch 1 (16–26 years)			Epoch 2 (27–40 years)		
	B(SE)	*p*	HR (95% CI)	B(SE)	*p*	HR (95% CI)
Female	0.40 (0.36)	0.27	1.49 (0.73–3.04)	−0.65 (0.35)	0.06	0.52 (0.26–1.03)
Fixed Factors Model						
Family Socioeconomic Status	−0.11 (0.31)	0.72	0.89 (0.48–1.65)			
Born into two-parent family	0.31 (0.43)	0.47	1.36(0.59–3.17)			
Parental use of physical punishment	0.41 (0.17)	**0.02**	1.50 (1.07–2.11)			
Scholastic performance	0.32 (0.22)	**0.15**	1.37 (0.89–2.11)			
Deviant peer affiliation*	0.00 (0.07)	0.96	1.00 (0.87–1.15)			
Early sexual intercourse	0.00 (0.33)	1.00	1.00 (0.52–1.92)			
Time-Dynamic Model						
Duration of relationship	0.00 (0.12)	0.97	1.00 (0.79–1.26)	0.02 (0.05)	0.55	1.02 (0.93–1.11)
Full-time employment	−0.78 (0.17)	**<.0001**	0.46 (0.33–0.64)	−0.40 (0.12)	**0.001**	0.67 (0.53–0.85)
Benefit				−0.86 (0.38)	**.02**	0.42 (0.20–0.89)
Alcohol problems	−0.16 (0.35)	0.65	0.85 (0.43–1.70)			
Enrolled in full-time study	−0.73 (0.60)	0.23	0.48 (0.15–1.58)			

Māori Culture				
Total Māori cultural score	0.06 (0.03)	**0.01**	1.07 (1.01–1.12)	

Note N = 123 $\chi^2(16) = 178.11$, $p<.0001$ * HR(95% CI) are all calculated to reflect one standard deviation change in the predictor.

Table 30

Association between the onset of parenthood and adult functioning outcomes at age 40 by Māori for new classification of Māori to exclude only descent

	Early onset N = 61 Māori N = 146 Non-Māori	Delayed onset N = 62 Māori N = 424 Non-Māori	Onset main effect	Māori descent main effect	Interaction
Socio-economic well-being					
%(n) Home ownership					
Māori	42.00 (21)	58.97 (23)	<.0001	.001	.27
Non-Māori	54.78 (86)	80.31 (359)			
M(SD) Socio-economic Status					
Māori	41.12 (14.21)	52.44 (15.81)	<.0001	.35	.35
Non-Māori	45.54 (16.85)	52.85 (16.51)			

	Early onset N = 61 Māori N = 146 Non-Māori	Delayed onset N = 62 Māori N = 424 Non-Māori	Onset main effect	Māori descent main effect	Interaction
M(SD) Gross family income (NZD, 000)					
Māori	89.98 (49.97)	140.53 (81.61)	<.0001	.20	.30
Non-Māori	104.81 (63.67)	140.17 (70.93)			
M(SD) Material Well-being					
Māori	25.40 (7.72)	29.64 (5.92)	<.0001	.53	.57
Non-Māori	26.32 (9.01)	29.67 (5.65)			
Education					
%(n) Higher Education					
Māori	11.48 (7)	42.50 (17)	<.0001	.008	.36
Non-Māori	25.95 (48)	54.70 (256)			
Household composition					
%(n) Steady Long-Term Relationship					

	Early onset N = 61 Māori N = 146 Non-Māori	Delayed onset N = 62 Māori N = 424 Non-Māori	Onset main effect	Māori descent main effect	Interaction
Māori	62.00 (31)	79.49 (31)	<.0001	.20	.62
Non-Māori	67.52 (106)	86.58 (387)			
M(SD) Household crowding					
Māori	0.76 (0.37)	0.70 (0.23)	.12	.04	.58
Non-Māori	0.68 (0.27)	0.66 (0.23)			
Psychosocial well-being					
M(SD) Social Support					
Māori	47.56 (10.38)	50.97 (8.14)	<.0001	.72	.94
Non-Māori	47.85 (10.44)	51.42 (7.76)			
M(SD) Self-esteem					
Māori	31.82 (4.22)	33.26 (4.69)	.0001	.95	.95
Non-Māori	31.75 (4.81)	33.25 (4.44)			

	Early onset N = 61 Māori N = 146 Non-Māori	Delayed onset N = 62 Māori N = 424 Non-Māori	Onset main effect	Māori descent main effect	Interaction
M(SD) Life Satisfaction					
Māori	42.74 (5.63)	44.08 (5.48)	.02	.98	.80
Non-Māori	42.87 (6.13)	43.90 (4.86)			
Mental health					
M(SD) Total Disorders					
Māori	0.62 (1.01)	0.36 (0.63)	.0001	.45	.96
Non-Māori	0.55 (0.97)	0.30 (0.68)			

Table G8

Association between the onset of parenthood and life course outcomes adjusted for childhood and adolescent factors for new classification of Māori to exclude only descent

	Early onset N=207*	Delayed onset N=486*	*p*	Cohen's *d*	Significant covariates*
Socio-economic well-being					
% Home ownership	62.63	74.11	.004	0.24	D, G, H, M, P, T, U
Mean Socio-economic Status	48.64	51.04	.06	0.14	B, D, N, O, P
Mean Gross family income (NZD, 000)	112.84	134.97	<.0001	0.30	A, D, K, O, P, U
Mean Material well-being	27.80	28.92	.07	0.17	A, D, F, J, L, M, P
Education					
% Higher Education	33.85	47.76	<.0001	0.28	B, C, D, I, J, O, P, R, T, U
Household composition					
% Steady Long-Term Relationship	70.67	84.68	<.0001	0.31	H, I, K
Mean household crowding	0.68	0.67	.56	0.04	A, D, G
Psychosocial well-being					

	Early onset N=207*	Delayed onset N=486*	*p*	Cohen's *d*	Significant covariates*
Mean Social Support	49.19	50.78	.04	0.18	G, K, L, M, O
Mean Self-esteem	32.49	32.95	.24	0.10	K, L, M, N, Q
Mean Life Satisfaction	43.37	43.67	.51	0.06	E, K, M, N, Q
Mental health					
Mean Total Number of Disorders	0.40	0.36	.53	0.05	F, H, I, J, K, L, M, S, U

Note Logistic regression/*z* test for dichotomous and linear regression / *t* test for continuous variables

*A – Gender, B – Socio-economic status (birth), C – Mothers education, D – Average family living standards, E – Mother's age at birth, F – Born into a two-parent family, G – Change of parents, H – Parental violence, I – Parental offending, J – Parental substance use, K – Parental Attachment, L – Childhood physical abuse, M – Childhood sexual abuse, N – Conduct disorder, O – Scholastic ability, P – Scholastic performance, Q – Neuroticism, R – Deviant peers, S – Depression prior to 15, T – Early sexual intercourse, U – Novelty seeking

Table G9

Association between the onset of parenthood and life course outcomes adjusted for childhood and adolescent factors as well as adult mediating factors for new classification of Māori to exclude only descent

	Early onset N = 207	Delayed onset N = 486	*p*	Cohen's *d*	Significant covariates
Socio-economic well-being					
% Home ownership	69.91	71.23	.73	.03	A, B, D
Mean gross family income (NZD, 000)	132.93	127.74	.38	.07	A, B, D
Education					
% Higher Education	41.97	46.54	0.23	.09	A, C, D, F
Household composition					
% Steady long-term relationship	78.01	81.45	.30	.08	A, D, E

Note A – Occupational choice, B – Accumulated Net Assets, C - Engagement in the workforce D – Partner Antisocial Behaviour, E – Social Support, F – Educational Attainment by 25

Table G10

Association between the onset of parenthood and Māori culture adjusting for prior history of Māori cultural scores for new classification of Māori to exclude only descent

	Early onset of parenthood	Delayed onset of parenthood	*p* value	Cohen's *d*
Unadjusted[1]	22.65	19.72	.07	.35
Adjusted[2]	21.64	22.05	.70	.05

Note 1: Observed M(SD) 2: Marginal Mean adjusted for prior cultural affiliation.